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FIRST REPORT

OF THE

COMMISSIONERS

FOR INQUIRING INTO THE

STATE OF LARGE TOWNS AND POPULOUS DISTRICTS.

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NOTICE.

Reference may be made to the more extended Folio Report and Appendix, presented to Parliament for much valuable information, which was of necessity excluded from these volumes on account of the importance of limiting them to a size more convenient for general circulation.

FIRST REPORT.

TO THE QUEEN'S MOST EXCELLENT MAJESTY.

We, the undersigned Commissioners appointed by Your Majesty to inquire into the present state of large towns and populous districts in England and Wales, with reference to the matters hereunder specified :—

Statement of the objects of the Commission.

“ The causes of disease among the inhabitants.

“ The best means of promoting and securing the public health, under the operation of the laws and regulations now in force, and the usages at present prevailing with regard to—

“ The drainage of lands ;

“ The erection, drainage, and ventilation of buildings ;

“ And the supply of water in such towns and districts, whether for purposes of health, or for the better protection of property from fire, and—

“ How far the public health and the condition of the poorer classes of the people of this realm, and the salubrity and safety of their dwellings may be promoted by the amendment of such laws, regulations, and usages ;” and to report our proceedings from time to time ; Humbly certify, in manner following, our proceedings in the execution of Your Majesty's Commission.

We desire, in the first place, to express the sense which we entertain of the importance of the subject committed to us, not only as involving general benefit to the public, but especially a gradual improvement in the moral and physical condition of large numbers of Your Majesty's poorer subjects. We have entered upon these duties with an earnest hope of being able in due time to fulfil the benevolent intention of Your Majesty's Commission.

Reason for delay of the statement of conclusions.

We confine this our First Report to a brief statement of our proceedings, and to a notice of such portions of the evidence, reports, and other documentary information which will best display the course of our inquiry, and the advance we have made to the attainment of the object of Your Majesty's Commission. Several investigations are yet in progress, the results of which it is necessary for us to receive and to consider in connection with the facts already in our possession, before we can form a matured opinion upon the nature of the measures which we may hereafter consider it to be our duty to recommend to Your Majesty.

Examinations of witnesses before the Board.

Having obtained the information, respecting the operation of the laws now in force, which had been collected under previous inquiries, and had been laid before Parliament, or could be acquired from other sources, we proceeded to examine before the Board such persons as were prepared from long experience or observation to give their testimony upon the general subject, or upon specific topics of inquiry. The evidence referred to is appended to this Report. Among the principal witnesses upon the general subject are physicians, whose attention had been specially directed on former occasions to the examination of the causes of disease among the poorer classes, and to the means for prevention, which come within the provisions of the existing law, or for the attainment of which further legislation is required.

Examinations cited, as showing the course of inquiry as to the general evils.

We would refer, in the first instance, to the evidence of Dr. N. Arnott[1] and Dr. Southwood Smith,[2] who have stated to us the results of their continued and latest observations; and also to the evidence of Dr. Guy,[3] Dr. Aldis,[4] Dr. Rigby,[5] and Mr. Toynbee,[6] who have had extensive practice in hospitals and dispensaries. This evidence, with that of Mr. Ward,[7] displays their opinion and experience, that defective drainage, neglect of house and street cleansing, ventilation, and imperfect supplies of water, contribute to produce atmospheric impurities which affect the general health and physical condition of the population, generating acute, chronic, and ultimately organic disease, especially scrofulous affections and consumption,[8] in addition to the fevers and other forms of disease, to which public attention has hitherto been chiefly directed by previous sanatory inquiries, and which are more distinctly noticed in the returns annually laid before Parliament under the provisions of the Registration Act.

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[1] Vol. i., p. 45. [2] Vol. i., p. 1. [3] Vol. i., p. 89. [4] Vol. i., p. 111. [5] Vol. i., p. 117. [6] Vol. i.. p. 67. [7] Vol. i., p. 41. [8] Vol. i., pp. 50, 69, 114, 115.

First specific inquiries in the metropolis, preparatory to local inquiries.

Our first investigations relating to drainage were directed to the condition of the metropolitan districts; we examined the chairmen and chief officers of the several Commissions of Sewers respecting their usages and regulations; and architects and builders as to the difficulties which have hitherto interfered with the adoption of a better system of house drainage.

Course of inquiries by circular queries to the chief towns and by local examinations.

We then extended our investigations, and for that purpose we prepared a letter enclosing a series of questions, framed by the Board, which, with a letter from Your Majesty's Principal Secretary of State for the Home Department, we transmitted to the municipal and other public officers in fifty towns where the rate of mortality appeared by the returns of the registers of deaths, with a few exceptions, to be the highest. These include the largest manufacturing towns and the principal ports after London, and contain a population of more than three millions of persons.

Each of these towns was afterwards visited by one of the Commissioners, who examined on the spot the general condition of the town, and of the most crowded and the most unhealthy districts, making personal inquiries of the inhabitants, and hearing such statements as were made by them, or respecting them, by medical and other officers. Some of these investigations, both local and on specific subjects, are yet in progress.

Course of inquir by Local Committees, and notices of specia reports.

We have great satisfaction in representing to Your Majesty that in these local inquiries a lively and cordial interest was taken by the inhabitants; the Commissioners were everywhere well received, and obtained ready assistance from persons of every class and denomination.

In addition to these our investigations, we promoted renewed inquiries by others into the sanatory state of several towns and populous districts,[1] more especially of those places where the growth of the population has been attended by a high rate of mortality. Some of these renewed inquiries have been of a closer and of a more comprehensive nature than those previously made, and have been conducted by persons of special qualifications from long attention to the subject, and acquaintance with the habits and condition of the population, thus possessing the best means of insuring approximation to accuracy.

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[1] Liverpool, Preston, York, Nottingham.

As an example, of a town chiefly commercial, the Report relating to Liverpool, by Dr. Duncan,[1] physician to the Liverpool Dispensary, shows the great extent of mortality, of which the local authorities and the principal inhabitants appear to have been, up to a recent period, unaware, but which has been fully established by the returns in the registers of deaths. Competent witnesses[2] concur in ascribing such an extent of mortality to the general want of drainage and cleansing, ill-conditioned dwellings, defective ventilation, scanty supplies of water, and to other causes capable of remedy.

As an instance of a population almost entirely engaged in manufactures, whose increasing numbers have also been accompanied by a progressive diminution of the mean age at death, as appears from an examination of the parochial and other registers, we submit the Report upon the Sanatory State of Preston, by the Rev. Mr. Clay,[3] and a committee of the inhabitants of that town.

The Report of Mr. Hawksley,[4] on the Condition of the Labouring Population of the Town of Nottingham, affords an example of widely different rates of mortality prevalent in different districts, and among different classes in the same town.

The returns obtained from the Ecclesall Bierlow Registration District of the mortality, as well as the rate of the births, which obtains amongst the artisans chiefly engaged in the manufacture of cutlery at Sheffield,[5] exhibits the different rates of mortality prevalent among artisans of similar occupations, when resident in the closer parts of the town, or in the more open suburbs.

To afford further information with respect to the extensive influence of one particular cause, namely, defective drainage, on another class of artisans engaged in one general occupation, we append the returns, which exhibit the results of a local inquiry, of the different rates of mortality prevalent in the well and ill-drained streets, almost exclusively occupied by the manufacturers of stockings, at Leicester.[1] The report of Mr. Holland, surgeon, of Chorlton-upon-Medlock,[2] presents an instance of the decrease in the rates of mortality that may be effected by the proper drainage of streets.

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[1] Vol. i., p. 122. [2] Vol. i., pp. 3, 50, 107. [3] Vol. i., p. 165.
[4] Vol. i., p. 318. [5] Vol. i., p. 271.

The further advance made in the investigation of the causes of mortality is displayed in the Report of Dr. Laycock,[3] tracing back, for upwards of two centuries, the operation of like physical causes, in the production of different forms of epidemic disease prevalent under similar conditions, always in the greatest intensity in the same quarters in the ancient metropolitan city and county town of York.—These Reports present examples of causes of mortality capable of removal, and which were found to prevail in a greater or less degree in each of the towns and populous districts examined by the members of this Commission.

The examination as to the existing laws for drainage.

On an examination of the state of the existing law respecting drainage, it appears that the Statute of Sewers, 23 Henry VIII. c. 5, under the provisions of which the principal Commissions of Sewers for the metropolis are issued, chiefly contemplates the drainage of surface waters. This statute, with other general laws[4] applicable to the drainage of parts of the metropolis, has given rise to a difference of opinion in regard to the powers conferred by them for the extension of new sewers. By some Commissions it is considered that, even for the above limited purpose, the authority is restricted to the repair or diversion of drains and sewers already in existence.

The provisions of subsequent local Acts, even of a late date, which give the power of forming new sewers, both in the metropolis and other towns, still contemplate chiefly the construction of works for the drainage of surface waters. The evidence shows that of the works hitherto executed the greater part have been constructed only on demands for the removal of pressing inconveniences, and for the drainage of particular places.

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[1] Vol. i., p. 269. [2] Vol. i., p. 202. [3] Vol. i., p. 217.

[4] 3 Jac. I. c. 14; 2 W. & M. sess. 2, c. 8.

The witnesses state that for the most part the usages at present prevailing, and the bye-laws in force under the authority of these statutes, have been (until two or three of the Commissions in the metropolis adapted their sewerage to the house drainage), framed with a view to the maintenance of the drainage of surface water only, and without reference to that system which is now admitted by all the medical witnesses to be of the greatest importance to the public health, to the condition of the poorer classes, and the salubrity of their dwellings, namely, house-drainage and sewerage, and the constant removal of all decomposing vegetable or animal refuse, much of which might be effected by means of the proper application of water.

In some of the larger and most crowded towns, all entrance into the sewers by house-drains, or drains from water-closets or cess-pools, is prohibited under a penalty. In other places, including a part of the metropolis, the entrance of house-drains is commonly deemed the concession of a privilege, subjected to regulations and separate proceedings, with attendant expenses, tending to restrict the use of the sewers for these most important purposes, or to confine the advantage to the wealthy.

In the local Acts we have examined, and in the bye-laws and usages in force under their authority, the use of the main drains is restricted under penalties from that which, if they were properly constructed and sufficiently supplied with water, it is stated, might be one of their most important services—namely, the rapid, efficient, and economical cleansing of a town of surface refuse, mud, and filth.

Examination of the local Acts for drainage.

These local Acts are found to be incomplete in various respects; they do not contemplate, nor do they contain, any provision for a previous general survey of the whole extent of the area proper to be included for a perfect system of drainage, which engineers examined on the subject state, should be comprehended under the same authority, in order to carry out measures at once efficient and economical; neither do they embrace the consideration of the separate works which should be comprised within such area; and they do not provide securities for the proper qualifications of the paid officers, to construct and superintend the maintenance of such works economically as well as efficiently.

Several of the local Improvement Acts confer no jurisdiction beyond the public highways, and give the authorities no powers to drain or cleanse the courts, alleys, and closes inhabited by the poorer classes. In several important towns which possess no separate legislative provisions, it appears that the existing drainage, commonly most defective, has been carried out under the powers given by the general Highway Act. In many towns the powers given are neglected, and in most of them imperfectly exercised.

Condition of the fifty towns visited as regards drainage and cleansing.

It appears from the unanimous statement of the visiting Commissioners, in addition to an examination of the replies of the 50 towns on the subjects of drainage and cleansing, that in scarcely one place can the drainage or sewerage be pronounced to be complete and good, while in seven it is indifferent, and in 42 decidedly bad[1] as regards the districts inhabited by the poorer classes. The investigations within the several towns of the arrangements for house as connected with street cleansing, present nearly the same results.

It appears that the local statements and opinions on what is deemed to be good, can only be received with reference to the imperfect standards known in those places. In the answers it is often stated that the drainage of a town is good, where it has been found that only the principal streets have main drains or sewers, and where the houses in those streets are but imperfectly provided with house or branch drains; while the most crowded portions of the town, those most densely inhabited by the poorer classes, are utterly neglected, and have no drainage, the refuse being allowed to accumulate and decompose in open channels and pools, or to run into open and stagnant ditches in the immediate vicinity of the houses.

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[1] P. xxxiv. *et seq.*

Review of the more recently proposed legislative measures.

The legislative measures more recently proposed for the sanatory improvement of towns have been directed chiefly to the extension of sewers into new districts. Competent witnesses[1] have stated that these measures being unaccompanied by any securities for efficiency and economy of construction, would only lead to the extension of works under the present system, in many particulars defective, and entailing unnecessary expense.

The measures proposed for the formation of house-drains have been on a scale and principle of construction, which the evidence brought before us shows to be frequently erroneous; they have hitherto included no principle or provision for the distribution over a series of years of the rates for defraying the expense, which, if levied by one collection, would, as shown in evidence,[2] often entirely absorb the immediate rents or profits of owners, and of the holders of short interests, who might derive but little benefit from the permanent works.

Evidence as to the inefficiency of the partial modes of drainage carried out under the existing law.

Evidence[3] has been produced before us, demonstrating that drains, when in other respects properly constructed, would confer little comparative benefit, if no provision be made for the introduction of supplies of water sufficient to cleanse them. Instances are adduced where such drains have only extended existing evils.

In districts in which both house and main drains exist, or are in course of extension, on an imperfect system, we have received strong evidence,[4] showing that as these sewers and drains are so formed as to allow decomposing refuse to accumulate, and to permit the escape of emanations into the streets or houses, the inhabitants do not derive a benefit in proportion to the expense incurred.

In the examination of the Chairman[5] of the Westminster division of sewers, will be found recited some of the medical testimony and complaints as to the effect of the emanations from the sewers which pass through the Strand, and other portions of that division of the metropolis. Mr. Dyce Guthrie,[6] surgeon, who has paid great attention to the subject of house-drainage, and who has carefully examined the works of extensive districts, explains the action of any partial system, and suggests, in common with other witnesses—engineers, architects, builders, and others, the necessity of including the proper application of supplies of water, the private house-drainage, the subordinate as well as the main drains under one system of scientific construction and management. Dr. Rigby,[1] physician to the General Lying-in Hospital, in York-road, adduces the example of an obstruction in a drain to show the evil effects that will ensue, unless the connection of the internal works for a complete house-drainage, and the works of external main drainage, be made necessary and component parts of an efficient measure.

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[1] Vol. ii., pp. 117, 169. [2] Vol. ii., pp. 147, 169. [3] Vol. i. p. 22; ii., p. 171. [4] Vol. i., pp. 22, 108, 120; ii., p. 249. [5] Vol. ii., p. 191. [6] Vol. ii., p. 241.

Course of inquiry as to house cleansing, by means of supplies of water carried into houses, and applied to well-constructed drains.

The medical witnesses have brought before us facts in support of their strongly urged and unanimous opinion, that no population can be healthy, which live amid cess-pools, or upon a soil permeated by decomposing animal or vegetable refuse, giving off impurities to the air in their houses and in the streets. They state the necessity of preventing all accumulations of stagnant refuse in or near houses, and of substituting a system of house-drainage and cleansing, aided by the introduction of better supplies of water into the houses. They have brought forward instances where the main drains or sewers were tolerably well formed, and subordinate or house-drains attached, but where from the want of properly directed supplies of water both house-drains and sewers only acted as extended cess-pools.[2]

In consequence of these facts, and others brought before us, connecting personal and household uncleanliness, a low state of health, and extensive disease, with the deficiency and impurity of the supplies of water in the districts inhabited by the poorer classes, we directed our special inquiries to those existing arrangements, to which these defects were attributed.

Course of inquiry as to supplies of water stated.

We find that the laws in force, and the usages at present prevailing with regard to the supply of water to the great majority of towns and districts investigated, provide only for carrying the mains through the principal streets. Upon an examination of the measures generally adopted and in force under the provisions of these laws, and the plans proposed to the legislature for their improvement, it appears that they all stop short of a most important point, namely, measures for carrying supplies under an economical and properly regulated system, into the habitations of the poorer consumers. In a large proportion of the poorer districts the inhabitants have only out-door supplies by means of stand-pipes or common tanks or wells. In many instances they are obliged to fetch water from considerable distances from their dwellings, at much inconvenience, delay, labour, and expense; in many towns they are dependent for supplies either on collections of rainwater, or on water taken from adjacent streams, or pumped from springs, frequently liable to be polluted.

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[1] Vol. i., p. 117.

[2] Vol. i. pp. 22, 50; Vol. ii. p. 171.

ndition of the ty towns visited regards supply water.

Upon the examination of the statements and answers from the towns to which our inquiries have been directed, it appears that only in six instances could the arrangements and the supplies be deemed in any comprehensive sense good; while in thirteen they appear to be indifferent, and in thirty-one so deficient as to be pronounced bad, and, so far as yet examined, frequently inferior in purity.[1]

The expense and various inconveniences entailed by the existing modes of supply by common stand-pipes or tanks, and the frequent and increasing pollution of the springs supplying the wells in some densely peopled districts, are stated in the evidence of Mr. Quick,[2] engineer, who has the management of the works of the Southwark Water Company.

The same witness describes a district in which, until a properly devised system of house-drainage be adopted, additional supplies of water, carried into houses, would frequently only increase the damp of the house, and the causes of disease, as well as of the dilapidations of the premises. In the evidence of Mr. Toynbee,[3] Mr. Liddle,[4] Mr. Quick,[5] and Dr. Aldis,[6] facts are stated showing the impurities and deterioration in water comparatively pure at its source, caused by the common mode of intermittent supply, which renders necessary the use of butts or tanks, especially in the manufacturing districts, and in towns and densely populated neighbourhoods where there is much smoke, and other impurities.

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[1] Vol. i., p. xxxiv. *et seq.* [2] Vol. ii., p. 117. [3] Vol. i., p. 81.
[4] Vol. i., p. 106. [5] Vol. ii., p. 128. [6] Vol. i., p. 112.

Course of inquiry as to tried measures of improvement.

The general facts disclosed in the course of our inquiry, led us to seek out and carefully examine all tried and successful measures of improvement that we could find in use.

The important advantages afforded by a constant supply of pure water kept on night and day, and superseding the necessity for the use and expense of water-butts and tanks, are stated in the evidence of Mr. Hawksley,[1] engineer to the Trent Water Works in the town of Nottingham, founded on an experience during twelve years, of an improved mode of supply introduced into that town. The evidence of Mr. Anderton,[2] manager of the Preston Water Works, gives the experience of a similar mode of supply during ten years in that town; and the evidence of Mr. Thom,[3] engineer of the Shaws Water Works at Greenock, supports these views. From the cities of Philadelphia and New York,[4] we have received information of much interest and importance in answer to the inquiries addressed by us, showing the successful operation of a system of a constant and ample supply of water adopted in those cities.

The evidence of Mr. Mylne,[5] the experienced engineer of the New River Company, shows the improvements in principle and detail which he has proposed for new districts. Mr. Ashton[6] of Hyde, and Mr. Smith[7] of Preston, owners of tenements occupied by the labouring classes, state their experience of the advantages in household and personal cleanliness, in health and direct saving of money, derived from the improvements effected by the extension of the supplies of water into the houses of their tenants.

Evidence relating to the constant supplies of water at high pressure for the extinction of fire.

Statements are made in the evidence upon this particular branch of our inquiry recommending the improved system of a constant supply of water at high pressure, as the most efficient means that have been yet introduced for the arrangement of supplies of water for the extinction of fires. The very important information collected on this head is contained in the answers (which also show the reduction that has been effected in the rates of insurance) from the cities of Philadelphia and New York, — in Mr. Hawksley's statement of experience at Nottingham,[1] in that of Mr. Anderton, at Preston,[2]— and in that of Mr. Quick,[3] in relation to the arrangements made for the protection of valuable warehouse property situated in the vicinity of those mains of the Southwark Water Company which are always kept charged at high pressure. Mr. Wicksteed[4] states that he has recommended the adoption of similar arrangements for parts of the city of Cork.

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[1] Vol. ii., p. 29. [2] Vol. ii., p. 148. [3] Vol. ii., p. 1. [4] Vol. ii., p. 136.
[5] Vol. ii., p. 101. [6] Vol. ii., p. 99. [7] Vol. ii., p. 146.

The course of inquiry as to the removal of the pecuniary obstacles to the voluntary adoption of admitted improvements.

The witnesses have uniformly stated that the great obstacle to the extensive voluntary adoption of improvements and works of admitted necessity, such as tenants' communication-pipes for supplies of water, or new drains for the drainage of houses, is the great expense of immediate outlay, which has been usually charged upon the owners or upon the occupiers, who are called upon to pay at once for permanent works (frequently imperfect and unnecessarily expensive), in which they have a very limited interest.

The cost of maintaining and extending such works, in many cases for distant districts, and the irregular manner in which the collections are made, often levied at uncertain intervals, are represented to have given rise to further objections.

The character of the evidence we have received of the oppressive effect of the immediate charges, and the obstructions they create to the improvement of the lower class of tenements, and the benefits anticipated from the adoption of an improved mode of defraying the expense, will be seen in the evidence of Mr. Jeremiah Little[5] and Mr. Bratt,[6] builders and owners of houses in the metropolis occupied by the labouring classes; in the evidence of Mr. Biers,[7] a builder, and Mr. W. Hickson,[8] an owner of tenements of a higher description, also in the metropolis; of Mr. Corbett,[9] Mr. Wroe,[10] and Mr. Hopkins,[11] of Manchester, and Mr. Kaye,[12] of Huddersfield.

Course of inquiry as to the greatest economy prac-

We have inquired carefully as to the practicability of reducing the expenses of works for house and main drainage, and for carrying supplies of pure water into all houses, so as to bring them within the pecuniary means of the poorest class of inhabitants.

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[1] Vol. ii., p. 28. [2] Vol. ii., p. 148. [3] Vol. ii., p. 132. [4] Vol. ii., p. 15.
[5] Vol. ii., p. 304. [6] Vol. ii., p. 310. [7] Vol. ii., p. 291. [8] Vol. ii., p. 230.
[9] Vol. ii.. p. 324. [10] Vol. ii., p. 341. [11] Vol. ii., p. 345. [12] Vol. ii. p. 331.

ticable in works for sanatory improvement.

Mr. Anderton, manager of the Preston Water-works, shows that the cost of new supplies may be reduced to one-sixth of the former expense, if the use of water-butts be dispensed with in new districts, by the adoption of the principle of a constant instead of the present intermittent supply, and if the tenants' communication-pipes be comprehended in one contract for construction and maintenance. Mr. Quick, engineer of the Southwark Water Company, states in his evidence founded on data from experience in the metropolis, that the expense for the immediate outlay might be reduced to one-fourth of the existing charge.[1] The evidence of Mr. Hawksley exhibits the nature of the data for his most important conclusion, that the result, accomplished in the town of Nottingham, is of possible attainment in many other extensive town districts in this country, and that an abundant supply of pure water may be carried into each of the lowest class of tenements, at a charge (giving a fair remuneration for the capital invested) which might not exceed *5s.* a year, or about one penny weekly for each tenement.[2] The same witness states, the small additional cost at which the water may be filtered, when requisite, and describes the precautions necessary to insure its purity.

The same witnesses state, with reference to house-drainage, that a saving may be effected of from one-half to one-third of the existing charges by the substitution of impermeable tube tile-drains of a superior construction,[3] for the common brick drains, which allow the decomposing liquid refuse to permeate through the foundations. Other competent witnesses state that, in many cases, the inconvenience of carrying the house-drains under the front rooms of houses and across wide streets may be avoided, and the whole expense be greatly reduced by a better arrangement, by leading them into small barrel drains, carried along the back of the tenements.

It appears by the adoption of an improved form of sewer in the Holborn and Finsbury division, that, in what are termed first-class sewers,[1] the expense of construction has been reduced from 21*s*. to 15*s*. per foot, and of the sewers for side streets from 15*s*. to 10*s*., amd in some cases to 8*s*. 6*d*. per foot; and, by an improved construction, the expense of traps to prevent the escape of foul air from gully-shoots into the streets, is reduced from 30*s*. to 10*s*. each, while in other metropolitan districts the charge for putting in each trap is still 3*l*. In the same division, by the adoption of a system of cleansing by flushing or flooding with water, the accumulation of deposits of decomposing substances has been prevented in a large proportion of the sewers; and by rendering unnecessary the mode of cleansing by hand labour and cartage (at once unhealthy and expensive), 50 per cent. of the former expense has been saved.

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[1] Vol. ii., p. 131.
[2] Vol. ii., p. 47.
[3] Vol. ii., pp. 74, 366, et seq.

Reasons for the inquiry into details.

The investigation of such details has appeared to us to be of the highest practical importance, as affecting the question of expense and efficiency. The statements we have received, are subject to considerable modifications in different places, from the varying prices of labour and materials; but hitherto, at almost every step in the progress of this detailed inquiry, it appears that the practical course of efficient improvement is not incompatible with the reduction of existing pecuniary charges, independent of the vast gain in the public health, convenience, and comfort.

Mr. Foden,[2] architect, in his evidence affords examples of works in use, and gives instances in support of similar conclusions advanced by other practical witnesses, that under appropriate arrangements water may be carried into houses, proper house-drains and means of cleansing introduced, and branch-sewers formed at nearly one-half the annual or weekly expense now incurred for the proper cleansing of the cesspools alone.

We have appended an estimate made by Mr. Coulthart,[3] of Ashton-under-Lyne, of the expense of all the works deemed requisite for the sanatory improvement of that town, as contrasted with the pecuniary saving of the expenses attendant upon excessive sickness and mortality.

Course of inquiry into the improved application of the

To the subject of the advantage to be derived from the sale and improved application of the refuse and sewage of refuse of towns to agricultural production.

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[1] Vol. ii., p. 171. [2] Vol. ii., p. 315. [3] Vol. i., p. 311.

towns, to the purposes of agriculture, we have directed and are directing our inquiries. In addition to the instance of the application of a part of the refuse of Edinburgh to agricultural production, which has already been made public, we append an account which we have obtained of a similar application in long and successful practice at Milan.[1] Mr. James Dean[2] states that this system is adopted at Ashburton in Devonshire. This topic is illustrated by the evidence of Captain Vetch,[3] who has paid much attention to this question, and has had occasion to report upon it after the survey of two towns with a view to the adoption of measures for their sanatory improvement; —the subject is further elucidated by Mr. Roe,[4] who was called upon to make surveys, for the drainage of Derby and Eton.

Inquiry as to means of obviating the objections to special rates and separate collections for new works.

In the course of the investigation at Hull, an instance of a consolidated collection of all improvement rates, as well as of all general and local taxes, was met with, and has been recommended to our attention, as obviating some of the inconveniences of a separate and special rate for local improvements, and of preventing the vexation and expense incurred by separate collections of the different rates for existing works. The advantage of this consolidated collection is displayed in the evidence of Mr. Fox of Sculcoates.[5]

Courses of inquiry as to the principle of spreading the reduced charge over a term of years.

The evidence recited generally recognizes that principle of legislation to be just and acceptable, which has been suggested for lightening the burthens of future improvements, by spreading the expense of the outlay over an extended period, so that the cost might be repaid within a reasonable time, with interest, by an annual rate, or by an addition to the rent, unless where the persons interested choose to perform the work themselves under proper regulations, or where they prefer liquidating the charge at once. But the application of this principle, which would in so many instances do away with objections to improvements on the ground of the immediate expense, and which would require to be accompanied by securities for the protection of absent parties, is a subject demanding further inquiry and consideration.

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[1] Vol. ii., p. 403. [2] Vol. ii., p. 407. [3] Vol. ii., p. 438. [4] Vol. ii., p. 176. [5] Vol. ii., p. 340.

Course of inquiry in respect to over-crowding and defective ventilation.

We have directed our inquiries into the evils attendant on the over-crowding of dwellings, and on the bad construction and imperfect ventilation of houses, and the defective regulations for the width of courts, alleys, and streets, causes which are represented as contributing largely to the extension of disease.

The evidence collected exhibits the great benefits derived from the introduction of ventilation, at an expense comparatively inconsiderable. Dr. Arnott[1] explains the means which he has devised for that purpose, and which he represents to be cheap, simple, and efficient. Mr. Toynbee[2] instances the successful application of one of those means to some of the over-crowded rooms, occupied both by artisans and by persons of the poorer class in the metropolis. The evidence of Dr. Rigby,[3] already referred to, shows the importance of ventilation in rendering successful other means taken to prevent the recurrence of severe epidemics in the hospital to which he is attached. Dr. Guy[4] furnishes examples of the improvement in the health of workmen, that may be anticipated from the introduction of ventilation to all workshops, in which large numbers are crowded, or in which processes are carried on injurious to health.

Measures of external ventilation, by arrangements for the proper width and direction of streets, open an extended field of inquiry. Mr. H. Austin, architect,[5] presents an instance where better arrangements of houses now formed into courts, alleys, and streets, would secure a superior ventilation and afford a good return for the outlay.

Course of inquiry as to the greatest economy practicable in works for sanatory improvement.

Builders of the humbler as well as of the higher class of tenements, state in their evidence losses incurred, and injuries done to the inhabitants, and to the property, by the building of houses at wrong levels, which might have been obviated had there been an authentic survey, with the proper levels laid down, to which they could have had access. These witnesses have attested the utility of pre-arranged lines of drainage, as guiding the direction of new buildings, where no other circumstance governs their disposition.

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[1] Vol. i., p. 57.
[2] Vol. i., p. 77.
[3] Vol. i., p. 119.
[4] Vol. i., p. 100.
[5] Vol. ii , p. 357.

Mr. Roe,[1] surveyor to the Holborn and Finsbury Commission of Sewers, gives an instance of the evil that has arisen from the want of such a survey as the basis for a correct system of drainage, and he has adduced an estimate of the large outlay probably requisite to repair the defects thus occasioned.

Course of inquiry as to the best description of surveys applicable to local improvement.

With reference to this branch of our inquiry, we have examined engineers and competent witnesses as to the best description of surveys requisite for the gradual, efficient, and economical improvement of old districts, and for the proper regulation of new districts. We refer especially to the evidence of Mr. Butler Williams,[2] Engineer and Professor of Geodesy to the College for Civil Engineers at Putney; of Captain Vetch[3] and Captain Dawson,[4] of the Royal Engineers; and of the Civil Engineers, Mr. Mylne[5] and Mr. Hawksley.[6]

We have obtained and appended to this Report specimens of surveys upon the scale adopted for the surveys of towns now in progress under the direction of the Board of Ordnance, with some estimates of their cost, made in compliance with our request, under the direction of Colonel Colby, R.E.[7]

Course of inquiries on offensive manufacturing processes.

Among the subjects still requiring investigation, are the effects of manufactories which emit offensive and deleterious effluvia; and in what manner injury to the public, arising from these causes, may be diminished or prevented.

Interments in towns.

In the course of our inquiries, evidence has been afforded of the pollution of wells, and the increased offensiveness of emanations from sewers caused by the infiltration of water passing through contiguous grave-yards. As the effects produced upon the Public Health by the practice of interments in towns have not been referred to this Commission, and as at the time we entered upon our duties that subject was under separate investigation, we have not directed our special attention to it.

Over-crowding and filth of common lodging-houses.

Among other important topics which we have before us is the subject of sanatory regulations for common lodging-houses, and the prevention of the filth and over-crowding, which often render them the seats of contagious diseases, a question which also involves local regulations of police.

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[1] Vol. ii., p. 173. [2] Ibid., p. 447. [3] Ibid., p. 432. [4] Ibid., p. 443. [5] Ibid., p. 101. [6] Ibid., p. 27. [7] Ibid., p. 484.

Our attention has been invited to the means of giving facilities for providing public walks, baths, or other convenient bathing places in the vicinity of populous towns.[1]

We have especially turned our attention to the means for improving the worst, and the most crowded districts, in large towns; a subject of great importance, and of very great difficulty. It may appear to be a comparatively easy task to provide against the occurrence, in new districts, of the evils which at present prevail in parts of old towns; but in the heart, and even in the immediate suburbs of towns, not only of ancient, but also of modern date, where these evils chiefly abound, the value of the property, the intricacy and variety of the interests involved, and the occupations and callings of the inhabitants, increase in a great degree the difficulty of devising measures which we may be able with confidence to recommend as effectual, and at the same time as capable of enforcement. In the recommendation of measures calculated to have a retrospective effect upon such masses of property, (the disposition of which has not hitherto been placed by the Legislature under any control,) the greatest caution is necessary, lest, while seeking to afford a remedy, injustice might be done to the inhabitants or the owners. This subject is still engaging our most anxious attention.

In order to admit of the recommendation of systematic and comprehensive measures, adequate to the magnitude of the subject, many practical details are involved, which must be minutely examined and viewed equally in respect to accuracy of principle, economy of execution, and adequate provision for regulating and defraying the necessary expenses.

We anticipate that it will be necessary to have recourse to the aid of the Legislature for further enactments, before the improvements so much to be desired can be fully accomplished; but at the same time it is our duty to state, that in many instances much might be effected, under the existing laws, to mitigate, if not to remove, many of the evils which now prevail.

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[1] Vol. i., pp. 292, *et seq.*; 300, *et seq.*

In presenting this our first Report to Your Majesty, we are anxious to express our opinion that the information already elicited offers the reasonable prospect that great improvements may be made to the general benefit of all, especially the poorer classes of Your Majesty's subjects. We entertain a confident hope that we shall be enabled to submit to Your Majesty recommendations adapted to carry out the object of Your Majesty's Commission within as short a period as may be compatible with the consideration due to so important a subject. To this end we are continuing our unremitting exertions.

(Signed) Buccleuch. (L.S.)
Lincoln. (L.S.)
Robt. A. Slaney. (L.S.)
George Graham. (L.S.)
H. T. De la Beche. (L.S.)
Lyon Playfair. (L.S.)
D. B. Reid, (L.S.)
Richd. Owen. (L.S.)
W. Denison, R.E. (L.S.)
J. R. Martin. (L.S.)
James Smith. (L.S.)
Robt. Stephenson. (L.S.)
W. Cubitt. (L.S.)

Gwydyr House, Whitehall,
June 27th, 1844.

QUESTIONS for CIRCULATION in POPULOUS TOWNS and DISTRICTS.

1. State the position of the town or district, and how it is situated with reference to the surrounding country.

2. What is the geological character of the country? Describe the nature of the surface-soil, and of the subsoil and substrata, and the facilities for, or impediments to, drainage?

3. Is the town or district liable to be flooded; and if so, to what extent?

4. Are there any obstructions to the natural drainage, or to the free flow or escape of the flood-water?

5. Is there any public survey of the town or district comprehending a system of levels from any common datum, for the proper regulation of private or public drainage, for the information of builders, or the regulation of new buildings, or for any other structural arrangements necessary for the protection of the public health and convenience?

6. What are the regulations for draining the town or districts? Are the streets, courts, and alleys laid out with proper inclinations for the discharge of surface-water, or are they uneven and unpaved, and favourable to the retention of stagnant moisture, and accumulations of refuse thrown from the houses? Are there any stagnant pools or open ditches contiguous to the dwellings, or in the vicinity?

7. Are there any arrangements for under-drainage, and are they efficient or defective? Are there any sewers or branch-drains in the streets?

8. Have the houses proper necessaries? Are they so arranged as to empty into drains or into cesspools, or in what manner are they cleansed? Are there any public necessaries; and if so, in what state are they kept, and under what regulations?

9. Are the house-drains properly cleansed by water or other means, or does the refuse accumulate in them so that they become choked and emit offensive smells?

10. Are the public sewers so constructed as to act without occasioning deposits or accumulations of decomposing refuse? Are they trapped so as to prevent the escape of offensive smells into the streets or houses, or are there any means used to prevent the formation of, or to remove such accumulations?

11. Are there any local regulations in force for the systematic drainage of the districts, streets, or houses, or for the amendment of those drains and sewers which are defective, and occasion accumulations of fuse and emit offensive smells?

12. Is a large proportion of the liquid refuse of the town thrown into the water-courses, or is it allowed to soak into the subsoil, or remain stagnant on the surface?

13. What is the sectional form of each description of sewer and branch house-drain, and what is the average cost of each per running foot?

14. How are the public sewers cleansed, and at what annual expense?

15. Is there any, and what service of scavengers for cleansing the streets, and how often and at what expense are these cleansed?

16. Are those courts and alleys which are inaccessible to carts and inhabited by the poorer classes cleansed by appointed scavengers, and how frequently and in what mode is refuse removed from such places, and at what expense?

17. Are the houses provided with dust-bins for the reception of refuse, and how frequently, and in what mode are they cleansed?

18. What places are used for the deposit of the refuse of the town, and to what extent is it sold for productive use as manure?

19. Is there any local authority vested with adequate powers, and duly responsible for their regular and impartial exercise, for the enforcement of cleansing, and the prevention of all public nuisances within the town or district?

20. In respect to the sites of the houses, are they laid out in wide streets, or are they built in narrow courts and alleys? Are any of the houses built back to back; are the courts closed at the end; are there any, and what arrangements for cleansing?

21. Are there any, and what proportion and description of cellar-dwellings; how are they lighted, drained, and ventilated; are they provided with fire-places?

22. Is there any local Act or provision to prevent the ends of streets being closed up, or crossed by new buildings, or to relieve the over-crowding of districts by promoting the regular extension and most advantageous disposition of suburbs, with proper reservation of open spaces?

23. Are the school-rooms for the labouring classes favourably constructed in respect to site, drainage, light, warmth, and ventilation? Are there proper necessaries attached to them? Have they any play-grounds?

24. Are there any open and convenient spaces for exercise, or are there any public parks, gardens, or walks, and in what state are they kept, and under what regulations?

25. Are there any proper open bathing-places or public baths?

26. From what source is the town supplied with water?

a. For domestic use?
b. For watering or cleansing the streets?
c. For the prevention of fires?

27. What are the qualities of the water supplied, and has there been any analysis of the water in general use? If so, annex it; if not, de-

scribe the qualities of the spring or river water, or rain water, and any complaints made, or evils experienced in respect to them?

28. Describe the several modes in use for the distribution of water.

29. Is the distribution by a private individual, by joint stock company, or by public officers?

30. What is the number of houses in the town and suburbs?

31. In how many houses is the water laid on, and have such houses each a separate tank?

32. Are the poorer classes supplied from stand-pipes placed at particular stations, from pumps or draw-wells, or are they in the habit of begging water from tradespeople with whom they deal; or how otherwise do they obtain it?

33. Have there been complaints of the mode in which the water is at present supplied to the population, as to the quantity, quality, or price?

34. What is the present annual charge for water laid on in the several classes of houses?

35. What is the quantity supplied for the different sums?

36. In case of the price being unduly enhanced, or of the supply being deficient in quantity or inferior in quality, are there any means of redress to the private individual, or to the public at large?

37. In respect to any deficiencies of supply in quality or quantity, what are the powers deemed requisite to remedy them?

38. Are filters extensively in use in private houses?

39. Is the water kept on constantly night and day, or how often is it kept on?

40. Is there any system of stand-pipes in the town, from which the water may be used for cleansing the pavements and the fronts of the houses?

41. Is it kept on constantly in the mains, so as to be at all times in readiness in all parts of the town in case of fire; is it kept on at high pressure, so that it may be thrown over the highest edifices in such a case?

42. In case of fire, how long is it usually before a full supply of water can be brought to bear on the premises?

43. What are the arrangements in respect to supplies of water for the protection of churches, or public buildings, or warehouses, or large private buildings, against fire?

44. What is the average number of fires in the year, and what are the prevailing causes?

45. Are any houses, or large ranges of buildings, unprotected by party-walls from the extension of fire?

46. Are there any well-appointed and practised engines, and service of firemen for the prevention of the extension of fires?

47. What is the general condition of the town or district with respect to health?

48. What is the state of the worst parts of the town, and especially those where, as appears from the mortuary registers, there is the highest rate of mortality; and where fever and other epidemic diseases are the most prevalent amongst the children or the adults?

49. What is the average duration of illness among the working classes throughout the year?

50. What is the general structure and condition of the dwellings of the poorer classes?

51. What number of families of the poorer classes, on the average, inhabit each house? What number of persons live in one room, and what is the general size of such room?

52. What is the general state of the air in the habitations of the poor? Are any arrangements introduced for ventilation?

53. Are the habitations of the labouring classes comfortably warmed in winter? What is the form and construction of the fire-place, and what is the nature of the fuel in common use?

54. Is gas-light generally introduced in the shops or dwelling-houses, and is any escape provided for the bad air which it produces?

55. What is the state of the lodging-houses for the poorer classes, and are there any police or other regulations with regard to them?

56. What proportion of the losses of rent and rates from the poorer descriptions of tenements are caused by interruption in the employment of the inmates, and expenses occasioned by sickness and mortality?

57. What is the extent of parochial or charitable relief given in aid of sickness in the districts where the average duration of life is the lowest?

58. To what extent is medical advice or assistance sought for by the poorer classes, and how far is it afforded to them gratuitously or otherwise?

59. Are there any hospitals or dispensaries in the town or district? What regulations are they under? What is the average number of patients?

60. To what extent and in what manner are the public buildings ventilated?

61. Are there any common lands belonging to the town, and of what extent and description?

62. Are there any powers under local Acts for enforcing regulations upon any of the above subjects? If so, furnish a copy.

Abstract of the Replies from 50 Towns to Questions 6, 7, 9, 11, 15, 16, 19, 26, and Supply of

	DRAINAGE.	
—	6. What are the regulations for draining the town or districts? Are the streets, courts, and alleys laid out with proper inclinations for the discharge of surface-water, or are they uneven and unpaved, and favourable to the retention of stagnant moisture, and accumulations of refuse thrown from the houses? Are there any stagnant pools or open ditches contiguous to the dwellings, or in the vicinity?	7. Are there any arrangements for under-drainage, and are they efficient or defective? Are there any sewers or branch drains in the streets?
Ashton	Regulation contained in the Local Police Act. Sewers good.	Efficient main sewers and branch drains in nearly all the streets.
Bath	No settled regulations	Under-drainage partially effective.
Bilston	No regulations	One main-drain, cross-drains in two instances only.
Birmingham	The greater part well drained	. . . .
Bolton (Little).	Regulated by trustees.	Efficient
Bradford	No regulations; accumulations of refuse thrown from the houses.	No arrangement for under-drainage.
Bristol.	Commissioners appointed under a Local Act; power only in the city.	There are main sewers and branch sewers.
Burslem	Principal streets well* paved and drained; in courts and alleys there are stagnant pools and open ditches.	Sufficient sewers in principal streets, but defective in the others.
Bury	No regulations; good sewers in some streets; stagnant open ditches in many places.	No arrangements for under-drainage.
Carlisle	No regulations; surface water frequently stagnates.	No systematic drainage; many drains made without artificial bottom; frequently filled up.
Chester	Badly drained; powers seldom enforced.	Not enforced for want of funds; great portion wholly without under-drains.
Chorlton	Sewers commenced nine years ago; many stagnant pools in the semi-rural districts.	Under-drainage of the finished streets good.
Coventry	No regular system	No arrangements for under-draining; some sewers in principal streets; drainage very defective.

Continued on

32, descriptive of their condition as to Sewerage, Drainage, Cleansing, and the Water.

DRAINAGE.	
9. Are the house-drains properly cleansed by water or other means, or does the refuse accumulate in them so that they become choked and emit offensive smells?	11. Are there any local regulations in force for the systematic drainage of the districts, streets, or houses, or for the amendment of those drains and sewers which are defective, and occasion accumulations of refuse and emit offensive smells?
House-drains properly cleansed . . .	The Police Act contains ample powers.
House-drains cleansed by water from the roof; they are occasionally obstructed.	Local Act for the parish of Walcot; three-fourths of the city under no public control.
Majority of the small houses have no drains.	No . . . .
Properly cleansed	Yes, under Local Act 9 Geo. IV. . . . .
Properly cleansed	Local Act . . . .
House-drains emit offensive smells . .	None, save the Highway Act. . . . .
House-drains are apt to accumulate deposits; many houses are without them.	The powers are defective, but generally well exercised.
House-drains communicate with sewers, except in some of the courts and alleys.	None, except Highway Act; accumulations of refuse in the courts and alleys.
Drains frequently choked up; very offensive.	Surveyors of highways have power, but neglect it.
House-drains liable to become choked; very offensive.	No local regulations. In consequence of the defective state of the sewers, the corporation now refuse to grant leave for opening communications with water-closets.
Open; only efficiently cleansed by heavy rains.	Local regulations, but not systematically enforced.
House-drains frequently choked; majority of houses have no drains at all.	Commissioners make sewers at one-half of the expense to the owners.
Refuse accumulates in the house-drains .	None . . . .

pp. xxxvi, xxxvii.

	CLEANSING.	
	15. Is there any, and what, service of scavengers for cleansing the streets, and how often and at what expense are these cleansed?	16. Are those courts and alleys which are inaccessible to carts, and inhabited by the poorer classes, cleansed by appointed scavengers; and how frequently; and in what mode is refuse removed from such places, and at what expense?
ASHTON	Streets well cleaned	Courts cleaned only by occupiers; refuse removed by farmers.
BATH	Scavengers employed; expense borne by landlords and tenants, not by a public body.	Refuse removed twice a-week by carts, at the expense of the rates.
BILSTON	Scavengers are employed . .	No; refuse removed by landlords or tenants inefficiently.
BIRMINGHAM . .	There are regular scavengers .	Courts and alleys are not within control; very filthy.
BOLTON (LITTLE) .	Cleansed by scavengers . . .	Only five courts, and these are cleansed by the inhabitants.
BRADFORD . . .	Scavengers employed. . . .	Courts and alleys very offensive.
BRISTOL	Scavenger duties well executed in main and branch streets.	Courts and alleys much neglected
BURSLEM . . .	Streets cleansed by surveyor of highways.	Cleansed only by the inhabitants
BURY	No regular scavengers; streets in a filthy state; channels choked up with refuse.	Contents wheeled into the streets; a sad nuisance.
CARLISLE . . .	Four scavengers are employed .	Refuse removed in wheelbarrows, at convenience of the inhabitants.
CHESTER	Cleansed at irregular intervals by paupers.	Courts and alleys never cleansed by public scavengers.
CHORLTON . . .	Streets cleansed by Whitworth's machine.	Unpaved streets and courts not cleansed; many dreadfully dirty.
COVENTRY . . .	There is a Scavengers' Act; a considerable sum of money is raised by rate; the expense 30*l.* per annum.	Courts and alleys not cleansed; refuse allowed to accumulate.

Continued

	SUPPLY OF WATER.	
19. Is there any local authority vested with adequate powers, and duly responsible for their regular and impartial exercise, for the enforcement of cleansing, and the prevention of all public nuisances within the town or district?	26. From what source is the town supplied with water? *a.* For domestic use? *b.* For watering or cleansing the streets? *c.* For the prevention of fires?	32. Are the poorer classes supplied from stand-pipes placed at particular stations, from pumps, or draw-wells; or are they in the habit of begging water from tradespeople with whom they deal; or how otherwise do they obtain it?
Nuisance Committee .	Supplied by Waterworks Company.	Poorer classes supplied by the Company; charge much too high.
There are three Local Acts, which are conflicting, and inadequate in their powers.	From springs which flow from the surrounding hills, corporation, Water Companies, and private individuals.	In parts of the city poor supplied gratuitously for five hours a-day by the corporation.
None	By Dudley Water-works Company.	By pumps and wells from the factories, and by begging.
Not sufficient powers .	By a Company; amply supplied	No gratuitous supply.
Local Act	Wells and Joint-Stock Company.	The poorest people beg water.
Local Act	Inadequate supply; works in progress.	From carts, three gallons for 1*d*.
The Commissioners of Sewers have power.	No Company; from wells and conduits.	The poor are badly supplied.
Local Act perfectly inadequate.	Two reservoirs, private . . .	From taps, for which they pay.
None whatever . .	Private pumps and Joint-Stock Company.	From pumps and springs; in some instances, landlords pay for supply.
Corporation have powers, but are found inadequate.	Supplied from the river; brought into the town in carts and by hand.	Sold at 1*d*. for eight gallons.
Powers seldom enforced; nuisances allowed to remain unabated.	From the river Dee by a Joint-stock Company, and from springs.	No supply for the poor; obtained by begging and from the river.
Town council have powers, but they are neglected.	Supplied by water-works, a Joint-stock Company.	The poor badly supplied; they often either beg or steal it.
Local Act of inadequate power.	A variety of sources and pumps.	Poorer classes obtain water from the pumps.

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	DRAINAGE.	
—	6. What are the regulations for draining the town or districts? Are the streets, courts, and alleys laid out with proper inclinations for the discharge of surface-water, or are they uneven and unpaved, and favourable to the retention of stagnant moisture, and accumulations of refuse thrown from the houses? Are there any stagnant pools or open ditches contiguous to the dwellings, or in the vicinity?	7. Are there any arrangements for under-drainage, and are they efficient or defective? Are there any sewers or branch drains in the streets?
Derby . . .	Local Act requires new streets to be, but not attended to; courts and yards neglected.	Sewers and drains very defective.
Dudley. . .	No regulations	Few public sewers, and inefficient.
Durham . .	No regulations	Drainage partial and very defective.
Frome . . .	No regulations; only such drains as they are enabled to make by the powers of the Highway Act.	A few drains in the streets . .
Gateshead. .	No regulations; accumulation suffered in the streets.	The whole extent of sewer less than 1000 yards.
Gloucester .	No regulations; stagnant pools and ditches in many parts of the town, filthy, and injurious to health.	No system of drainage . . .
Halifax . .	No public arrangements for a system of drainage.	No arrangements for under-drainage.
Hanley and Shelton.	No regulations; drainage very defective.	Very defective, except in principal streets.
Hull . . .	No regulations; open ditches; receive drainage in the outskirts of the town.	Sewers in most of the streets .
Kidderminster	Stagnant pools contiguous to dwellings.	There are sewers and drains, but very inefficient and defective.
Leicester . .	No regulations; stagnant and offensive accumulation.	Most defective and inconvenient.
Liverpool . .	Drainage defective, particularly the north end of the town; full of pits of stagnant water.	Sewers in the main streets, courts, and alleys neglected; refuse rots on the surface; the liquid matter is absorbed, and finds its way into the cellar.
Longton . .	No regulations; no regard to public health or convenience.	None in some of the main streets
Manchester .	No special regulations, except for private sewers.	Main streets have sewers, out districts imperfect; many streets have no sewers.

Continued on

DRAINAGE.	
9.	11.
Are the house-drains properly cleansed by water or other means, or does the refuse accumulate in them so that they become choked and emit offensive smells?	Are there any local regulations in force for the systematic drainage of the districts, streets, or houses, or for the amendment of those drains and sewers which are defective, and occasion accumulations of refuse, and emit offensive smells
Refuse accumulates in house-drains to a great extent.	No regular system.
Not cleansed, and very offensive	No local regulations
Not properly cleansed by any method.	No regulations.
House-drains are rare	No Local Act
Private drains conveyed into the kennels of the streets; very offensive.	No local regulations
No system	No
House-drains frequently choked and offensive.	No regulations whatever
House-drains very imperfect, often choked.	No regulations, except Highway Act, and that only for the principal streets.
House-drains choked and smell offensively.	No local regulations
Open drains, most offensive.	No systematic drainage; very defective.
House-drains not properly cleansed; choked by accumulation of silt.	None
House-drains, when they do exist, are are not properly cleansed.	Local Act defective; water-closets not allowed to flow into the sewers.
No attention paid	No
Very litttle attention paid to house-drains.	Local Act

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	CLEANSING.	
—	15. Is there any, and what, service of scavengers for cleansing the streets, and how often and at what expense are these cleansed?	16. Are those courts and alleys which are inaccessible to carts, and inhabited by the poorer classes, cleansed by appointed scavengers, and how frequently and in what mode is refuse removed from such places, and at what expense?
DERBY	Regular service of scavengers .	Courts and yards in a most filthy state; refuse never removed.
DUDLEY	Streets cleansed at an expense of about 300*l.* per year.	Not cleansed; refuse accumulates by the road side.
DURHAM	Streets *supposed* to be swept three times in a fortnight.	Refuse removed at the convenience of the inhabitants.
FROME	The streets are fairly cleansed .	No regulations . . . . .
GATESHEAD . . .	Scavengers appointed by the town council.	Courts and alleys replete with the most offensive accumulations.
GLOUCESTER . . .	Cleansing very imperfectly done; in one parish there is none.	Refuse allowed to accumulate .
HALIFAX . . .	. . . .	. . . . .
HANLEY & SHELTON	No regular scavenger, except for the market.	No regulations . . . . .
HULL	Scavengered under street assessors; part of the town under no system.	Under no regulations for cleansing.
KIDDERMINSTER .	Contractor under Local Act takes the sweepings.	Never done; no appointed scavengers.
LEICESTER . . .	Tolerably cleansed by parish surveyors.	Courts and alleys neglected; refuse thrown into dung-holes.
LIVERPOOL . . .	Scavenging done by paupers generally; lower and north parts of the town in a filthy condition.	Courts and alleys cleaned by the inhabitants very inefficiently.
LONGTON . . .	No public scavengers . . .	No . . . .
MANCHESTER . .	Cleansed by appointed scavengers, and machine.	Courts and alleys neglected, considered private property.

Continued on

	SUPPLY OF WATER.	
19.	26.	32.
re any local autho- ested with adequate s, and duly respon- for their regular and tial exercise, for the ement of cleansing he prevention of all nuisances within wn or district ?	From what source is the town supplied with water ? a. For domestic use ? b. For watering or cleansing the streets ? c. For the prevention of fires ?	Are the poorer classes supplied from stand-pipes placed at particular stations, from pumps, or draw-wells; or are they in the habit of begging water from tradespeople with whom they deal ; or how otherwise do they obtain it ?
ocal authority dequate powers.	Wells and water-works, the property of private individuals.	Poor very badly supplied.
nadequate pow-	By Water-works Company and wells.	Impure from wells.
issioners under aving Act.	Supplied from a spring and the the river.	From the fountain in the market-place, wells, and by begging.
ecial officers for urpose.	No public supply	The poor badly off for water.
wn Council have powers.	Water Company	Sold to the poor at a farthing for four gallons ; others from springs, where they frequently have to wait one to three hours.
aws under the cipal Corpora- Act.	Wells, pumps, and a Company .	The poor very inadequately supplied.
. . .	From springs	Great difficulty experienced by the poor in procuring water.
ssioners of Po- ave power to re- nuisances.	From an old coal-works ; no provision in case of fire.	The poor greatly in want of water.
tions but very quate.	Very inefficiently supplied by water-works belonging to the Corporation.	By pipes.
ineffective .	Wells generally	Pumps.
l authority with ate powers.	Town supplied by a spring ; conveyed by pipes.	. . . .
Act and Health wn Committee.	Two public Companies ; water extremely pure.	No public pumps or fountains; many of the poor beg or steal it.
Act not enforced	From reservoirs belonging to the Duke of Sutherland.	All are supplied.
Act and Paving mittee.	Supplied by Water Companies .	The poor very badly supplied.

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	DRAINAGE.	
	6.	7.
	[illegible] for draining the town or [illegible] courts, and alleys laid [illegible] for the discharge of [illegible] they uneven and unpaved, [illegible] the retention of stagnant [illegible] accumulations of refuse thrown [illegible] ? Are there any stagnant pools [illegible] contiguous to the dwellings or in	Are there any arrangements for under-drainage, and are they efficient or defective? Are there any sewers or branch drains in the streets
[illegible]	[illegible] ations; many new streets [illegible] sewers; stagnant water- [illegible] and open ditches.	Drainage very defective; under no control.
[illegible]	[illegible] ulations; filth allowed to accumulate; open ditches.	No arrangements, except in the main streets.
[illegible]	No regulation. A custom prevails of throwing refuse into the streets, which are often in an objectionable state.	Under-drainage very deficient .
[illegible]	Surface-drains with cesspools in all the streets; stagnant ditch supposed to infect the health of the neighbourhood.	Main sewers in the principal streets.
[illegible] .	Principal portion naturally drained; inferior parts neither drained or paved.	Sewers very defective and unsystematic.
[illegible]STON. .	No regulations; in the side streets open pools and stagnant refuse.	Two good sewers, but no systematic drainage.
[illegible]MOUTH .	No rules for drainage; surface water carried into the sea; great part of the town without any drainage whatever.	Sewers defective and objectionable, being merely for the purpose of taking off the surface water; no branch-drains.
[illegible] . .	No regulations; drainage very insufficient.	There are sewers in some streets.
[illegible] . .	No regulations; stagnant pools and open ditches in many parts.	Good sewers in the main streets; want of powers a great evil.
[illegible] . .	Powers under the Improvement Act very deficient; sewers very defective.	Drainage in the out townships lamentably defective.
[illegible] . .	No regulations	No arrangements provided in the Act of Parliament.
[illegible] .	No regulations for drainage: in the suburbs there are several open ditches.	Portions of the town not drained; in the suburbs no efficient arrangements.
[illegible]	Powers limited; open drains contiguous to dwellings.	Under-drainage defective, owing to the want of pecuniary means.

Continued on

DRAINAGE.	
9. Are the house-drains properly cleansed by water or other means, or does the refuse accumulate in them so that they become choked and emit offensive smells?	11. Are there any local regulations in force for the systematic drainage of the districts, streets, or houses, or for the amendment of those drains and sewers which are defective, and occasion accumulations of refuse and emit offensive smells?
No control over drains from houses.	No local regulations . . . .
House-drains only for slops.	None . . . .
House-drains not cleansed by water; very offensive.	No local regulations . . . .
House-drains continually choked up and offensive.	Regulations under Paving Commissioners.
House-drains generally clean by good supply of water.	No local regulations . . . .
Refuse accumulate in house-drains, very offensive.	No Local Acts . . . .
House-drains flow into cesspools; very offensive.	Local Acts . . . .
The house-drains are few in number . .	There are many stagnant pools, which evaporate, or are absorbed by the subsoil.
No arrangements for cleansing house-drains.	Great want of local superintendence.
House-drains of inadequate size and bad construction.	Local Act . . . .
Partially cleansed	None . . . .
The town generally sufficient, in the susuburbs great complaints.	No . . . .
But few house-drains; refuse accumulates, and smell offensively.	Under the limited power of the Commissioners.

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	CLEANSING.	
	15.	16.
—	Is there any, and what, service of scavengers for cleansing the streets, and how often and at what expense are these cleansed?	Are those courts and alleys which are inaccessible to carts, and inhabited by the poorer classes, cleansed by appointed scavengers, and how frequently and in what mode is refuse removed from such places, and at what expense?
Newcastle	Scavenging done by contract; principal streets attended to; inferior streets only occasionally.	Courts and alleys not being thoroughfares in a very objectionable condition.
Newcastle-under-Lyne	Cleansed for 20*l.* a-year	Courts and alleys entirely neglected.
North Shields	Four scavengers constantly employed.	Courts and alleys not cleansed; the inhabitants carry the refuse into the streets.
Norwich	All streets within the walls cleansed by scavengers; very imperfect.	Courts and yards not under Paving Commissioners; never cleansed until removed by some farmers.
Nottingham	No service of scavengers; the poorest parts entirely neglected.	Refuse of courts and alleys allowed to accumulate.
Pendleton	No arrangements for scavenging	Courts and alleys neglected till cleansed by nightmen.
Portsmouth	Scavengers are employed, but the streets in a neglected state.	Courts and alleys neglected; refuse and filth collected by the lowest class for manure.
Preston	The streets ought to be cleansed once a-week; the expense is about 500*l.* a-year.	The courts and alleys and undedicated streets are not cleansed.
Rochdale	Principal streets cleansed twice a-week; unpaved streets never cleansed.	Courts and alleys are not cleansed.
Salford	Only scavengers employed by trustees of the roads.	Courts and alleys very foul and neglected.
Sheffield	. . . .	Courts and alleys never cleansed by the scavengers.
Shrewsbury	There is a service of scavengers	Courts and alleys not cleansed, nor the suburbs.
South Shields	Scavengers are employed daily	Refuse removed once a-week.

Continued on

	SUPPLY OF WATER.	
19. ere any local autho- vested with adequate ers, and duly respon- e for their regular and artial exercise, for the rcement of cleansing, the prevention of all lic nuisances within town or district?	26. From what source is the town supplied with water? *a.* For domestic use? *b.* For watering or cleansing the streets? c. For the prevention of fires?	32. Are the poorer classes supplied from stand-pipes placed at particular stations, from pumps, or draw-wells; or are they in the habit of begging water from tradespeople with whom they deal; or how otherwise do they obtain it?
l Act, but no mary power.	Principal supply from the Tyne and springs; impure from the drainage of the sewers.	The poor supplied from stand-cocks in the streets.
l Act	Water-works, pumps, and wells, private.	By pumps and open shallow wells.
missioners have er, but being self- ted are an in- cient body.	Good supply from springs and Water-works.	Poor supplied from stand-pipes and carts.
l Act very imper- .	Supplied by four individuals, under the Corporation.	Supply for the poor very inadequate.
local authority h adequate powers.	Well supplied by two Water Companies.	Poorer classes supplied from water-cocks.
Local Act; with- any local autho- es.	Very deficient supply; many cottages without any.	Few pumps, but dependent on distant springs, or buy it when hawked about.
l Act; no autho- to enforce cleans- .	Supplied by a Company; complaints made both of quantity and of supply, and quality of the water.	Poor beg water of the neighbours.
Police Commis- ers are the only horities for this pose.	Water Company	. . . .
e Act, but not ient.	Public Water-works by Joint-Stock Company.	Supplied by wells, as well as the Company.
rs of Local Act ted.	Supplied by Manchester Water-works Company.	. . . .
. . . .	Water-works; Joint-Stock Company.	By branch-pipe.
rs not adequate .	Springs and soft water, by a Company.	Public conduits; in some parts from carts
r in the Commis- ers.	From the river Tyne and three springs, and Water Company.	Poor supplied by stand-pipes and carts.

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—	DRAINAGE.	
	6. What are the regulations for draining the town or districts? Are the streets, courts, and alleys laid out with proper inclinations for the discharge of surface-water, or are they uneven and unpaved, and favourable to the retention of stagnant moisture, and accumulations of refuse thrown from the houses? Are there any stagnant pools or open ditches contiguous to the dwellings, or in the vicinity?	7. Are there any arrangements for under-drainage, and are they efficient or defective? Are there any sewers or branch drains in the streets?
Stourbridge	Naturally drained	Sewers in all the streets
Sunderland	Regulations in Local Act; defective.	Under-drainage defective, and quite inadequate.
Swansea	Regulations miserably bad; streets ill-laid, not paved, and stagnant pools contiguous to dwellings.	Drainage ineffective and deficient.
Walsal	No system of drainage	Few streets have public sewers
Wednesbury	No regulations	No; public drains much wanted
WestBromwich	Many stagnant pools; accumulations of refuse where the poorer class reside.	None
Wigan	No regulations; many stagnant pools and open ditches.	No arrangements for under-drainage; there are sewers in the main streets.
Wolverhampton.	No adequate regulations	None in the new streets of small houses.
Wrexham	No regulations for drainage; filth allowed to accumulate in open ditches.	Drains in a few main streets—inefficient and defective.
York	Drainage, &c., managed by 40 Commissioners.	Efficiently drained

DRAINAGE.	
9. Are the house-drains properly cleansed by water or other means, or does the refuse accumulate in them so that they become choked and emit offensive smells?	11. Are there any local regulations in force for the systematic drainage of the districts, streets, or houses, or for the amendment of those drains and sewers which are defective, and occasion accumulations of refuse, and emit offensive smells?
No inconvenience felt	A Local Act . . . .
Very few houses drained; no system of cleansing; refuse accumulates.	No local regulations except the Improvement Act, and very inefficient.
House not properly cleansed; smell offensively.	No system of draining of a regular or efficient character.
House drainage by surface gutters. . .	Local Act; but it does not enforce a system of drainage.
No house-drains	No . . . .
Refuse accumulate in drains; smell offensive.	None . . . .
No general system of cleansing house-drains.	No local regulations in force . . . . .
Deficient in all but the best streets . .	No . . . .
Generally very defective; only to be found in the better houses.	Only the general powers of the surveyor of highways.
House-drains managed by each individual; some are too small and become choked.	Local Act . . . .

	CLEANSING.	
—	15. Is there any, and what, service of scavengers for cleansing the streets, and how often and at what expense are these cleansed?	16. Are those courts and alleys which are inaccessible to carts, and inhabited by the poorer classes, cleansed by appointed scavengers, and how frequently and in what mode is refuse removed from such places, and at what expense?
STOURBRIDGE . .	Two principal streets cleansed, others imperfectly.	No; the refuse removed by farmers.
SUNDERLAND . .	Scavengers cart away refuse as it accumulates.	Courts and alleys cleansed by scavengers.
SWANSEA . . .	Scavengers appointed by Local Act.	Duty very imperfectly done; in many places not cleansed once in three months.
WALSAL . . .	Two scavengers are employed .	No; they are considered private
WEDNESBURY . .	Public streets cleansed . . .	No; in a filthy condition . .
WEST BROMWICH .	None	No public scavengers . . .
WIGAN	No regular service of scavengers.	Courts and alleys are not cleansed.
WOLVERHAMPTON .	Yes	Not done at all . . . . .
WREXHAM . . .	None	No . . . .
YORK	Scavenging, &c., done by contract.	Courts and alleys not considered within the jurisdiction of Commissioners; cleansed by the inhabitants.

	SUPPLY OF WATER.	
19. Is there any local authority vested with adequate powers, and duly responsible for their regular and impartial exercise, for the enforcement of cleansing, and the prevention of all public nuisances within the town or district?	26. From what source is the town supplied with water? *a.* For domestic use? *b.* For watering or cleansing the streets? *c.* For the prevention of fires?	32. Are the poorer classes supplied from stand-pipes placed at particular stations, from pumps, or draw-wells; or are they in the habit of begging water from tradespeople with whom they deal; or how otherwise do they obtain it?
No	Wells and private pumps . .	Wells and the river Stour.
No authority with adequate powers.	Good supply from Water-works by Joint-Stock Company.	Poor supplied from stand-pipes a farthing for five gallons.
Local Act very defective, and much requires revision.	About one-fourth of the inhabitants supplied from waterworks.	Supply by public pumps, and vendors selling at so much per pailful.
The Town Act . .	Badly supplied	By public pumps.
No	Badly supplied	From the river.
None	Wells	Wells and pumps.
None	Partially supplied by Company, springs and pumps; none for prevention of fires.	Water supplied to the poor for one hour a-day at 1*d.* per family.
Local Act very defective	Private supply very deficient .	From pumps.
No	Private pumps	None.
Powers tolerably efficient.	. . . .	. . . .

TABLE showing the DEATHS of PERSONS in 1841; and a Calculation of the Excess of Deaths above a Mortality of 2·0 per Cent., for the Years 1840, 1841, and 1842.

[***Extracted from the Quarterly Table of Mortality issued under the Direction of the Registrar-General, June,* 1843.**]

—	Population in 1841.	Deaths of Persons in 1841.					Deaths of Persons in 1840, 1841, and 1842.			
		Total No. whose Deaths were Registered.	Under Five Years of Age.	By Consumption.	By Fever and Epidemic Diseases.	By other Diseases.	Total No. whose Deaths were Registered.	Mortality per Cent.	No. of Deaths which would have happened if the Mortality had been 2·0 per Cent.	Excess of Deaths above the rate of 2 per Cent.
Ashton & Oldham	173,964	4,282	2,049	921	773	2,588	13,941	2·7	10,438	3,503
Aston . . .	50,928	1,113	527	198	178	737	3,424	2·2	3,056	368
Basford . . .	59,634	1,163	513	180	223	760	3,957	2·2	3,578	379
Bath	69,232	1,728	508	302	276	1,150	5,300	2·6	4,154	1,146
Birmingham .	138,187	3,673	1,776	700	683	2,290	11,019	2·7	8,291	2,728
Bolton . . .	97,519	2,572	1,268	439	686	1,447	8,079	2·8	5,851	2,228
Bradford . . .	132,164	3,041	1,543	541	625	1,875	9,540	2·4	7,030	1,610
Bristol . . .	64,298	1,895	681	281	357	1,257	5,996	3·1	3,858	2,138
Bury	77,496	2,064	936	427	504	1,133	6,221	2·7	4,650	1,571
Carlisle . . .	36,084	925	383	151	193	581	2,666	2·5	2,165	501
Clifton . . .	66,233	1,519	641	197	328	994	4,768	2·4	3,974	794
Coventry . .	31,028	905	430	170	268	467	2,411	2·6	1,862	549
Derby . . .	35,015	914	448	171	250	493	2,749	2·6	2,101	648
Dudley . . .	86,028	2,296	1,395	215	656	1,425	6,650	2·6	5,162	1,488
Gateshead . .	38,747	989	440	135	190	664	2,914	2·5	2,325	589
Halifax . . .	109,175	2,202	917	382	309	1,511	6,828	2·1	6,551	277
Hull	41,130	1,206	515	164	236	806	3,690	3·0	2,468	1,222
Kidderminster .	29,408	582	190	120	87	375	1,873	2·1	1,764	109
Leeds . . .	168,667	4,361	2,042	688	892	2,781	13,463	2·7	10,120	3,343
Leicester . .	50,932	1,358	588	288	256	814	4,545	3·0	3,056	1,489
Liverpool . .	223,054	7,556	3,944	1,484	1,677	4,395	23,433	3·5	13,383	10,050
Manchester . .	192,408	5,821	2,788	973	1,163	3,685	18,461	3·2	11,544	6,917
Newcastle . .	71,850	2,104	1,019	328	480	1,296	5,787	2·7	4,311	1,476
Norwich . . .	61,846	1,362	459	245	234	883	4,696	2·5	3,711	985
Nottingham . .	53,080	1,239	565	243	191	805	4,462	2·8	3,185	1,277
Preston . . .	77,189	2,026	981	344	512	1,170	6,713	2·9	4,631	2,082
Rochdale . .	60,577	1,417	641	299	269	849	4,761	2·6	3,635	1,126
Salford . . .	70,228	1,971	1,031	223	434	1,314	5,946	2·8	4,214	1,732
Sheffield . . .	85,076	2,231	1,109	395	436	1,400	6,823	2·7	5,105	1,718
Shrewsbury . .	..	520	145	113	68	339	1,665	2·6	1,292	373
Sunderland . .	56,226	1,512	736	205	224	1,087	4,382	2·6	3,374	1,008
Tynemouth . .	55,625	1,340	521	168	190	982	3,910	2·3	3,338	572
Walsall . . .	34,274	832	463	114	223	495	2,672	2·6	2,056	616
Wigan . . .	66,032	1,561	678	271	323	967	5,293	2·7	3,962	1,331
Wolverhampton & Seisdon	89,722	2,153	1,189	304	558	1,291	6,689	2·8	4,843	1,846
York	47,779	1,039	324	189	102	748	3,381	2·4	2,867	514
Totals .	2,791,835	73,472	34,518	12,568	15,054	45,850	229,108	2·7	168,805	60,303

I.

ON THE CAUSES OF DISEASE, AND THE MEANS OF PREVENTION.

THOMAS SOUTHWOOD SMITH, Esq., M.D., examined.

T. Southwood Smith, Esq., M.D.

You are Physician of the London Fever Hospital, and resident in the east of London?——I am.

Are you well acquainted with that district?——I am very well.

Have you turned your attention to the state of the dwellings of the humbler classes in different parts of London, particularly the eastern part of it?——I have.

Have you had an opportunity of becoming well acquainted with the localities referred to?——For the last fifteen or twenty years my attention has been constantly called to their condition; partly from my connection with the London Fever Hospital, but still more from my office as Physician to the Eastern Dispensary, which administers relief to the poor of the most populous portion of the eastern district of London.

The Fourth Report of the Poor Law Commissioners contains a Report made by you "on some of the physical causes of sickness and mortality to which the poor are particularly exposed, and which are capable of removal by sanatory regulations, exemplified in the present condition of the Bethnal-green and Whitechapel districts." May the Commissioners consider that it was made on your own personal inspection, and one which you are now able to verify?——Yes; and with the increasing force resulting from increased experience.

You state, in general, that the neglect in cleansing and drainage, and particularly of those provisions which are advantageous to the dwellings of the humbler classes, has been productive of very great evils in that district?——Very great.

That fever constantly prevails, generated by the dirt and filth in which the people habitually live?——That is too true.

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You state, "The records of the London Fever Hospital prove indubitably that there are certain localities in the metropolis and its vicinity which are the constant seats of fever, from which this disease is never absent, though it may prevail less extensively, and be less severe in some years, and even in some seasons of the same year, than in others, but still in which it is incessantly committing its ravages?"——That is perfectly correct.

You then go on to name the districts from which fever is seldom or never absent: are those the districts in which the same evils still continue to prevail?——Yes; and the experience of the present has afforded a remarkable verification of the correctness of these statements; for the metropolis has, during this period, been visited by an epidemic which is still raging; but this fever does not equally prevail in every part of London, nor even in every fever district.

What do you mean by a fever district?——I mean a district in which fever is always so prevalent that the locality in question may be regarded as the ordinary seat of this disease. Now the present epidemic is not equally prevalent in all such districts, but it is confined to a certain number of them. The Commissioners, however, may form some judgment of the extent to which it has recently prevailed from the fact that, in the four months from the commencement of January in the present year to the end of April, we have actually received into the wards of the Fever Hospital 500 fever patients; and during a considerable portion of that time for days together we have refused applications for admission at the rate of thirty or forty a-day, in consequence of not having room. Now the remarkable fact is, that those cases come to us from certain districts which are as familiar to us as our own names.

The evils which you described in 1838 as referable to these districts still continue, and with increasing virulence?——At the present moment with increasing virulence, certainly.

The districts referred to contain a vast population, not in one part of London alone, but in different portions of it, to which the same considerations apply?——The fever districts of the metropolis are situated in different parts of it; and it is in accordance with ordinary experience to find fever raging in some of these districts, at the very time that others are enjoying a temporary immunity from it. In former years I have found, on my personal examination, some localities in which there was not a single house in which fever had not prevailed, and in some cases not a single room in a single house in which there had not been fever. I observed this particularly in certain localities in Bethnal-green and Whitechapel: now, during the present year, there has been a very remarkable absence of fever in these its ordinary seats, while in other districts it has been more than commonly prevalent.

Did you attribute that, in those districts, to bad drainage, or

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want of water, or some causes of that kind?——In every district in which fever returns frequently, and prevails extensively, there is uniformly bad sewage, a bad supply of water, a bad supply of scavengers, and a consequent accumulation of filth; and I have observed this to be so uniformly and generally the case, that I have been accustomed to express the fact in this way. If you trace down the fever districts on a map, and then compare that map with the map of the Commissioners of Sewers, you will find that, wherever the Commissioners of Sewers have not been, there fever is prevalent; and, on the contrary, wherever they have been, there fever is comparatively absent.

This statement is made in your Report—"It appears that the streets, courts, alleys, and houses in which fever first breaks out, and in which it becomes most prevalent and fatal, are invariably those in the immediate neighbourhood of uncovered sewers, stagnant ditches and ponds, gutters always full of putrefying matter, nightmen's yards, and privies the soil of which lies openly exposed, and is seldom or never removed. It is not possible for any language to convey an adequate conception of the poisonous condition in which large portions of both these districts always remain, winter and summer, in dry and in rainy seasons, from the masses of putrefying matter which are allowed to accumulate." Does much of that to which you refer still remain in the same state?——It is essentially the same. I have very recently been over the same places with a distinguished foreigner, who takes an interest in the welfare of the humbler classes, and who was desirous, his attention having been drawn to these Reports, to test their accuracy by a personal inspection of the places described. Before we set out on our visit he could not conceal that he thought the description exaggerated. From the cleanliness, neatness, and apparent healthfulness of the main streets and thoroughfares in London, he could not bring himself to believe that there could be large districts containing hundreds of thousands of the people allowed, year after year, to remain in such a neglected and poisonous condition. "It would be incredible," said he, "it would be unworthy of your state of civilization, were such descriptions true, even of a few isolated places; but when it is asserted that they are true of the localities in which a very large proportion of the population resides, I own I feel curious to see these places." It so happens that the district over which I took this gentleman has been improved in some respects since these Reports were written. A common sewer has been made in the most densely crowded and filthiest locality; and the very worst place I ever saw, namely, Baker's-arms-alley, a narrow court in Rosemary-lane, Whitechapel, has been materially changed for the better, by the building of the Blackwall Railway directly through it. But these improvements relate only to a few of the larger thoroughfares; the places most concealed from the public view, the most

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close, crowded, and filthy districts, remain wholly unaltered. When my foreign friend saw these places, he admitted that the wretchedness of their condition had been understated: when he expressed his astonishment that a concern for the common safety had not induced the authorities to attend to the sanatory condition of these extensive districts, I told him (but he thought the statement scarcely mended the matter) that these places were as unknown to our legislators, to almost all our people in power, as an hour ago they had been to himself.

Have you, from your experience in these matters, formed a strong opinion that the fevers and other diseases to which the humbler classes in these populous districts are subject might be, to a great extent, removed by cleansing, draining, and improvements in building?—Every day's experience convinces me that a very large proportion of these evils is capable of being removed; that if proper attention were paid to sanatory measures the mortality of these districts would be most materially diminished; perhaps in some places one-third, and in others even one-half.

Are you aware that the rate of mortality is actually found to be nearly double in some of the neglected districts in the east, compared with what it is in the western part of London?——I am; and this interesting and important fact is dependent on several circumstances, and not on any one cause. Thus a large proportion of the people who reside in the western part of London consist of the wealthier, while the eastern part is principally inhabited by the poorer classes. The higher value of life indicated in the western district is partly owing to the better food and clothing of the wealthier classes, to their more temperate habits, and less exhausting labour, and especially to the better care taken of their infants and children, and in general to the more favourable circumstances under which infancy and childhood, the most precarious and mortal epochs of human life, are placed. But still the poorer classes, in these neglected localities and dwellings, are exposed to causes of disease and death which are peculiar to them; the operation of these peculiar causes is steady, unceasing, sure; and the result is the same as if twenty or thirty thousand of these people were annually taken out of their wretched dwellings and put to death, the actual fact being that they are allowed to remain in them and die. I am now speaking of what silently, but surely, takes place every year in the metropolis alone, and do not include in this estimate the numbers that perish from these causes in the other great cities, and in the towns and villages of the kingdom. It has been stated that "the annual slaughter in England and Wales, from preventible causes, of typhus fever, which attacks persons in the vigour of life, is double the amount of what was suffered by the allied armies in the battle of Waterloo." This is no exaggerated statement; this great battle against our people is every year fought and won; and yet few take account of it, partly for the very reason

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that it takes place every year. However appalling the picture presented to the mind by this statement, it may be justly regarded as a literal expression of the truth. I am myself convinced, from what I constantly see of the ravages of this disease, that this mode of putting the result does not give an exaggerated expression of it. Indeed the most appalling expression of it would be the mere cold statement of it in figures.

But great as the mortality from these causes may be, do you think the mortality alone includes the whole of the evil?——Certainly not; the number of people who die can be taken only as an indication of the much greater number who fall sick. The mortality, even of the London Fever Hospital, to which the worst cases of fever in the metropolis are sent, is not, on an average of ten years, more than one in seven; in some years it is not more than one in ten or twelve, and, comparing the number attacked with the number that die over the whole kingdom, the mortality would not, in ordinary years, amount to one in twelve: so that the number of sufferers from this disease is at least twelve times greater than the number of persons that actually perish from it.

The classes of the population referred to are chiefly those occupied in labour; in case of their being affected by fever they are, of course, disabled from obtaining subsistence for their families?——This is among one of the most powerful causes of pauperism. The Returns made in the year 1838 to the Poor Law Commissioners from the twenty metropolitan unions, in answer to queries sent to the medical officers, with a view to ascertain the actual prevalence of fever during one year, contained columns to show the number of persons receiving parochial relief in the several unions, as well as the number actually attacked with fever. From these returns it appears, that of the total number who received parochial relief in most of the districts a very large proportion received it in consequence of their being ill with fever; but in one district, namely, St. George's, Southwark, out of 1467 persons who received parochial relief, 1276, that is, the whole number with the exception of 191, are reported to have been ill with fever. This is an unusually large proportion; but these returns in general place in a very striking point of view the pauperizing influence of fever.

If this be the case, the power of the humble classes of getting their bread and maintaining their families is extremely diminished by the neglect of sewage, draining, and cleansing which exists in those localities?——There is a special reason why it must be so, the knowledge of which has been taught by large experience, though that knowledge has hitherto been confined to very few: but the fact itself is one which ought to be familiar to the mind of every man, and more especially to that of the legislator. There are certain diseases which prevail so remarkably at certain epochs of life, that you may assume that three-fourths of the persons who

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die at those epochs die of those diseases. Now it is established by indubitable evidence, that of all the acute diseases to which the human frame is subject, during that variable, but most important, period of human life which intervenes between puberty (when the dangers of infancy and childhood have been passed) and old age, —of all the acute diseases which cut short this, the most precious part of the term of existence, and the *only* part of that term which it is in the power of human precaution and wisdom to extend indefinitely, fever is incomparably the most prevalent: so prevalent, indeed, that it may be said to be *the* disease of adolescence and manhood. I was first taught this fact while making some researches into the cause and results of fever, derived chiefly from the records of the Fever Hospital, and as long ago as the year 1830 I published a table exhibiting the evidence of it. I took out one by one the ages of all the persons who had died of fever in this hospital during the four years from 1825 to 1828, both inclusive, being the four years immediately preceding the year in which I was making the investigation. The results are most instructive and important, and are shown in this table:—

TABLE of AGES of Persons attacked with Fever.

Age for 1825.		Age for 1826.		Age for 1827.		Age for 1828.	
Under 10 . .	42	Under 10 . .	27	Under 10 . .	25	Under 10 . .	31
15 . .	67	15 . .	87	15 . .	70	15 . .	80
20 . .	172	20 . .	170	20 . .	163	20 . .	136
25 . .	133	25 . .	143	25 . .	164	25 . .	107
30 . .	81	30 . .	102	30 . .	107	30 . .	84
35 . .	29	35 . .	46	35 . .	35	35 . .	47
40 . .	28	40 . .	37	40 . .	50	40 . .	45
45 . .	10	45 . .	28	45 . .	20	45 . .	21
50 . .	10	50 . .	13	50 . .	13	50 . .	17
55 . .	10	55 . .	7	55 . .	8	55 . .	6
60 . .	1	60 . .	5	60 . .	13	60 . .	14
65 . .	1	65 . .	3	65 . .	2	65 . .	6
70 . .	2	70 . .	3	70 . .	4	70 . .	1
75 . .	1	75 . .	4	75 . .	2	75 . .	2
80 . .	1	80 . .	1	80 . .	0	80 . .	0
85 . .	0	85 . .	0	85 . .	0	85 . .	0
Total . . .	588	Total	676	Total	676	Total	597

From this table it appears that during the year 1825 there were attacked with fever, under twenty years of age, 109; between twenty and forty years of age, 443; and between forty and sixty years of age, 31. Further, it appears that in the five years from ten to fifteen the number attacked was 67; but in the five years from fifteen to twenty they increased to 172; in the succeeding five years, from twenty to twenty-five, they were 133; while in the five years from twenty-five to thirty, they sunk to 81; in the succeeding five years, from thirty to thirty-five, they still further diminished to 29; and in the five years from thirty-five to forty, they were

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only 28. In like manner, during the year 1826 the number attacked under twenty years of age was 114; but between twenty and forty years of age the number was 498, while between forty and sixty years of age the number was only 53. The results during the years 1827 and 1828 were perfectly similar. Taking the four years together the total number attacked was 2537; of these the number attacked under twenty years of age was 429; between twenty and thirty years of age the number was 1188; between thirty and forty years of age the number was 531; and between forty and eighty years of age the number was 389: whence it follows that of the total number attacked, those between twenty and thirty years of age nearly equal the number attacked at all other ages put together, the number between twenty and thirty being 1188, and at all other ages only 1349. In the Circulars sent by the Poor Law Commissioners to the medical officers of the twenty metropolitan unions in the year 1839, I requested that a column might be made for the ages of those attacked with fever, with a view of testing the correctness of the data on which the preceding table was founded by a still larger observation, and the returns obtained afford analogous results. Two consequences follow of the highest interest and importance. First, it is clear from these tables that the period of human existence during which fever can alone be said to be prevalent is from the age of twenty to forty; that is, the period of maturity, the most precious portion of the term of existence, that during which the individual is best fitted for all the duties and enjoyments of life, during which he is most capable of promoting the happiness of others, and of securing and appreciating his own. But of this period that portion which is incomparably the most subject to the ravages of this malady is the earliest portion. Now it must be borne in mind that the poorer classes usually marry and have families at earlier ages than the middle and higher, the great majority, at least of the women, being married at twenty. Of course it is during the succeeding ten years that they have young families, often very numerous ones, to support; but we have just seen that this is precisely the ten years in which fever is so prevalent as to furnish, in this comparatively short space of time, nearly as many cases as all the other periods of life put together. It follows, not only that the heads of families are more subject to the ravages of fever than any other class of persons, but that these persons are peculiarly liable to be attacked precisely at that period of life when they have the greatest number of young children entirely dependent on their daily labour for support. This is deserving of consideration, viewing the subject merely with reference to the pressure on the poor rates, but viewing it in its larger relation to the well-being of the humbler classes, it appears to me to deserve great attention. Its importance is strengthened by the results of the following table, which shows the proportion of the sexes attacked with fever:—

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TABLE showing the Proportion of the Sexes attacked with Fever.

1825		1826		1827		1828	
Males . .	289	Males . .	325	Males . .	337	Males . .	278
Females .	299	Females .	351	Females .	339	Females .	319
Total . .	588	Total . .	676	Total . .	676	Total . .	597

From this table it appears that in each of these four years a somewhat larger number of females than of males were attacked with fever; that is, a proportionally larger number of mothers were disabled from nursing their children and attending to their families, every such family being of course thereby placed in the greatest possible disorder and distress, the disease of the mother being in many cases the direct and immediate cause of her husband and her children becoming similarly affected.

Have you any evidence to show the rate of mortality in fever, with reference to the ages of the persons attacked?——Yes. I submitted the experience of the London Fever Hospital for the ten years preceding January, 1834—an observation including nearly 6000 patients affected with this malady—to Mr. Finlaison, the Government actuary, by whom it was subjected to calculation. Among other curious and instructive results it was found that the mortality of fever resolves itself into the following remarkable progression. Thus, suppose 100,000 patients to be attacked with this disease between the ages of 5 and 16, of these there would die 8266; and of an equal number—

Between	15 and 26	there would die	11,494
,,	25 ,, 36	,,	17,071
,,	35 ,, 46	,,	21,960
,,	45 ,, 56	,,	30,493
,,	55 ,, 66	,,	40,708
,,	65 and upwards		44,643

Thus the risk of life from this malady is twice as great at the age of thirty-one as it is at eleven; it is also nearly twice as great at forty-one as it is at twenty-one; it is five times as great at sixty-one as it is at eleven; and nearly four times as great above sixty-five as it is at twenty-one.

Then, according to this calculation, although the rate of mortality in fever progressively and rapidly increases as age advances, yet the number of persons who actually perish by this disease at the adult age, and in the meridian of life, is far greater than at any other period of existence?——It is so on account of the much greater number of persons who are attacked at those epochs. By far the greatest number attacked is, as we have seen, between the ages of twenty and thirty; but according to this calculation the risk of life from this malady at the age of thirty-one is just double the risk at the age of eleven.

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You say that fever is the disease to which the poorer classes are peculiarly subject, as arising from the filthy state of the districts and the wretched condition of the dwellings in which they reside; but is fever the only disease produced by these causes?——I particularize fever, because fever is the most obvious and the most rapidly fatal of the diseases arising from the neglect of sewage, ventilation, and cleanliness; but it would be a very inadequate view of the pernicious agency of the poison unceasingly generated in these filthy and neglected districts, to restrict it to the disease the most obviously produced by it. Its indirect action is highly noxious, though the evil is not so manifest. It is a matter of constant observation, that even when not present in sufficient intensity to produce fever, by disturbing the function of some organ, or some set of organs, and thereby weakening the general system, this poison acts as a powerful predisposing cause of some of the most common and fatal maladies to which the human body is subject. For example, the deaths occasioned in this country by diseases of the digestive organs, by inflammation of the air-passages and lungs, and by consumption, form by far the largest proportion of the annual mortality. Now no one who lives long in or near a malarian district is ever for a single hour free from some disease of the digestive organs. But disordered states of the digestive organs not only constitute in themselves highly painful and even fatal maladies, but they lay the foundation of several other mortal diseases. By a disordered state of the digestive organs, for example, the body is often so much enfeebled that it is wholly incapable of resisting the frequent and sudden changes of temperature to which this climate is subject:—the consequence is, that the person thus enfeebled perishes by inflammation set up in some vital organ, and more especially in the air-passages and lungs, or by consumption, the consequence of that inflammation; so that to the total number of deaths that take place annually from fever in its different forms must be added those caused by the indirect operation of the same poison that produces fever.

Your experience then leads you to the conclusion that these causes, even when they do not produce fever and other acute diseases, operate materially in affecting the health, and incapacitating from labour?——Yes; even when they do not produce acute diseases, and at once lay the individual aside, they produce diseases of the nutritive system, and thus injure the constitution, diminish its power of resisting the numerous causes of disease to which the body is commonly exposed, and so enfeeble it that the individual is very much incapacitated from labour.

So that those who live in such situations, even when they are not positively attacked by acute disease, are nevertheless undergoing a process of deterioration?——That is universally and strikingly indicated in two ways. First, by the incapacity of the mothers to attend to their children; and secondly, by the bad

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health of the children, and their great mortality. It has been already shown by the experience of the Fever Hospital that the mothers are more susceptible of fever than the husbands; but when not labouring under acute disease the mothers are often so enfeebled as to be unable to attend properly to their domestic duties, so that the children are not taken due care of, while the sickness of the children becomes an enormous tax on the time and wages of the parents.

In consequence of the disease and weakness generated by the condition in which they live, the ability of the labouring classes to support themselves, you conceive, is very much diminished?——Very much.

Has that the effect of throwing them on parish relief in many instances?——In very many.

Has it the effect also of calling for the aid of the charitable, and occasioning an increased expense to hospitals and dispensaries?——Yes; and the consequent burden on private individuals and public institutions is the least part of the evil. The great evil of this state of things is its tendency to break down the spirit of independence, and to reduce large classes of the people to the degradation and wretchedness of depending for their support on charity, and not on their own industry.

Have you any reason to believe that their mental faculties are impaired, as well as their bodily health?——There is evidence, that as they have not the bodily vigour and the industrious habits of a healthy and independent peasantry, so they have not the intelligence and spirit proper to such a race. One of the most melancholy proofs of this is in the quiet and unresisting manner in which they succumb to the wretchedness of their lot. They make no effort to get into happier circumstances; their dulness and apathy indicate an equal degree of mental as of physical paralysis, and this has struck other observers who have had opportunities of becoming acquainted with the real state of these people. In the Poor Law Commissioners' Report on the Sanatory Condition of the Labouring Population there is the following statement, which impressed my mind the more because it recalled to my recollection vividly similar cases witnessed by myself:—"In the year 1836," says one of the medical officers of the West Derby Union, "I attended a family of thirteen—twelve of whom had typhus fever, without a bed in the *cellar*, without straw or timber shavings—frequent substitutes. They lay on the floor, and so crowded that I could scarcely pass between them. In another house I attended fourteen patients: there were only two beds in the house. All the patients lay on the boards, and during their illness never had their clothes off. I met with many cases in similar conditions; yet amidst the greatest destitution and want of domestic comfort, *I ave never heard, during the course of twelve years' practice, a comlaint of inconvenient accommodation.*" Now this want of com-

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plaint under such circumstances appears to me to constitute a very melancholy part of this condition. It shows that physical wretchedness has done its worst on the human sufferer, for it has destroyed his mind. The wretchedness being greater than humanity can bear, annihilates the mental faculties—the faculties distinctive of the human being. There is a kind of satisfaction in the thought, for it sets a limit to the capacity of suffering which would otherwise be without bound.

With reference to these poor persons, you state that great expense is cast upon the community in the form of poor-rates and of subscriptions to hospitals and dispensaries, and in other modes, in order to give them the aid they require. Does the assistance thus afforded extend to the support of the widows and orphans of those who are carried off by death?——The table to which I have already directed your attention affords the most impressive and instructive answer to that question. This table shows that the immense majority of the persons who are attacked with fever, and who die of this disease, are between the ages of twenty and forty; that is, the heads of families. But the fathers and mothers perishing in a state of destitution, of course the orphan children must be thrown for support upon the community.

Do you think that if proper measures were carried out, such as good building regulations, a good system of drainage, and a good supply of water, which might improve the health of the persons resident in those districts, the additional expense which might be cast upon them in the form of a reasonable rent put on, would be considerably less than the cost to which the community is now put by the illness arising from the neglect of those provisions?——Ultimately it would be less. When once such regulations have been brought into practical operation, and have become general in a district, the cost of maintaining such a district in a healthy condition would be comparatively slight. In the meantime the sum of money now expended in the mitigation of the evil, slight as that mitigation is, would form a very important contribution towards the fund necessary to defray the cost of removing existing nuisances, and putting a district into a good sanatory condition.

That would be an application of the same sum from the relief to the prevention of calamity?——Yes, prevention being always better than cure; and in this case you cannot in fact cure. As long as the poor remain in the situations which produce their disease, the proper remedies for such disease cannot be applied to them; they cannot, for example, be surrounded with pure and fresh air—the prime remedy.

So that no expense incurred in attempts to remedy the evil, when once produced, can be effectual?——It cannot; and, on the other hand, the apparent sum expended in carrying out sanatory regulations, is not a true expression of the actual sum spent on

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preventive measures, because, from the actual sum spent in carrying out sanatory or preventive measures must be deducted the large amount of money now annually expended in the support of individuals and their families, deprived of health, and therefore of the ability to labour, or rendered widows and orphans through the non-adoption of those remedial measures.

You have to a certain extent stated that in the Supplement alluded to, where you say, "The cost of these parishes, for the relief of their fever cases, amounts to a large sum. By the returns from the Bethnal-green and Whitechapel Unions, it appears that the extra expense for fever cases for the quarter ending Lady-day, 1838, is: to the Bethnal-green Union, 216*l.* 19*s.*; to the Whitechapel Union, 400*l.*; altogether 616*l.* 19*s.*" And you go on to say,—"Thus, at the rate of the last quarter, there will be incurred, during the present year, for the relief of fever cases in these two parishes alone, the sum of 2467*l.* 16*s.*?"——That is perfectly correct, being drawn from accurate data, from the books of those particular parishes; and I think that may be taken as a sort of indication of what the saving might be.

Do you conceive, by proper preventive measures, properly carried out, those sums now so inadequately spent might be very much reduced?——Certainly.

Do you think the moral character and energy for the purposes of exertion, and employment of those persons, is very much lessened in consequence of their suffering, both from fever and the other diseases you have mentioned, and the continual neglect in which they appear to live?——The poison generated in these neglected districts, and to which these poor persons are habitually exposed, is a sedative poison, among the most distinctive characters of which are the depressing effects produced by it both on body and mind. This is one of the main causes, not only of the mental apathy, of which I have already spoken, but also of that physical listlessness which makes them incapable of any great exertion. I am satisfied that this feeling of depression is one of their chief inducements to the use of stimulants, which the same feeling naturally leads them to take in excess whenever a sufficient quantity can be procured. I quite believe, from what I have observed of them, that the inducement to take the most pernicious amount of stimulants often arises from a sensation of lassitude and languor, the direct result of the debilitating causes that are incessantly acting upon them, and that renders them so incapable of physical and mental exertion. Every one who has observed his own sensations during the few days which precede an acute attack of fever, can well appreciate that feeling of *mal-aise,* more intolerable than pain; and it is no wonder that they fly to anything which affords a prospect of temporary relief from it.

When you speak of stimulants, do you mean that it drives them o the use of ardent spirits?——Yes; and some to opium.

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Is not opium now used to a great extent?——To a much greater extent than any one could credit who is not aware of the evidence of the fact.

Does the observation which you have made as to adults apply to children?——It applies particularly to children. The inquiries recently made under the Children's Employment Commission are very extensive, because the terms of that Commission directed an investigation to be made into the actual condition of the children employed, not only in mines and collieries, but also in all branches of trade and manufacture whatever, in which children work together in numbers, not included under the Factories Regulation Act. It was found impossible to describe the condition of the children without giving some account of the domestic habits and mode of life of the parents; and among the facts brought to light under this inquiry, one of the most remarkable is the extent to which opium is proved to be used by the poorer classes, and more especially to the extent to which it is given by mothers to their children. Among others, Dr. Mitchell, one of the Sub-Commissioners, reports that the medical witnesses examined by him state that the infants and children are seldom brought to them before they are benumbed and stupified with opiates; the usual preparation given being Godfrey's cordial, a mixture of treacle and opium, known by the name of "comfort," and an article in constant demand. A little girl will come to the chemists and ask for a dose of it to give to the baby next day, telling him that her mother is going out to wash. A respectable chemist stated that he made twenty gallons of "comfort" in the year, and that there were chemists who lived near the market-place, and more in the way of the country people, who made a good deal more. "It must not be supposed," adds the Sub-Commissioner, "that such medical treatment of children is peculiar to colliers, or only prevails in places far remote from the light of the metropolis; for, on making inquiry of a medical man, and of a chemist, at Croydon, in Surrey, the same thing was found to exist there, and in the country around." Speaking of the districts of Nottingham, Derby, and Leicester, another Sub-Commissioner, Mr. Grainger, states that the practice of administering opium to infants, which is very general in these districts, "is usually begun when the child is three or four weeks old." But Mr. Brown, the coroner of Nottingham, states "that he knows Godfrey's cordial is given on the day of birth, and that even it is prepared in readiness for that event." The extent to which the system is carried may be judged from the fact, expressly ascertained by this gentleman, that one druggist made up in one year 13 cwt. of treacle into Godfrey's cordial. The result of this terrible practice is, that great numbers of infants perish, either suddenly, from an over-dose, or, as more commonly happens, slowly, painfully, and insidiously. Those who escape with life become pale and sickly children, often half idiotic, and always with a ruined constitution. "Compared with this,"

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adds the Sub-Commissioner, "the Chinese practice of infanticide may be called merciful."

Do the general debilitating and demoralizing effects, which you have described as acting on the adults, commonly act in like manner on the children?——The children are comparatively exempt from some of these evils,—from continued fever, for example, in all its forms; but then they are more liable than the children of the higher classes to the exanthematous fevers, that is, acute fevers, accompanied with an efflorescence, or rash, upon the skin, scarlet-fever, small-pox, measles, &c. The poisonous condition of the districts in which they spend the first weeks, months, and years of their existence, predisposes them to these dangerous diseases, and renders such diseases fearfully mortal. The result is shown in the tables of the Registrar-General. In Birmingham, for example, in which the condition of the working classes is better than in most other large towns, one-half of the total number of deaths registered are those of children under five years of age.

Though they may escape with life, are children so brought up, amidst such neglect, and dirt, and disease, likely to form strong and healthy subjects; or, on the contrary, to be persons of weak constitutions and habits, liable constantly to trouble the community? ——They must be a constant burthen on the state; and it is found that even those who do endeavour to support themselves usually adopt all sorts of expedients to shun anything in the shape of labour, betaking themselves to such occupations as do not require any great amount of physical exertion. However advantageous to them an occupation of the latter kind may be, they shrink from it, because they know that they shall break down if they undertake it.

Is it not almost impracticable in those districts where the drainage and cleansing, and the decencies of life are neglected, in the privies and receptacles for filth, for decent persons to continue the better habits they may have formed in other places where they have formerly resided?——Quite impossible; it tends to destroy everything approaching to, I will not say refinement, but the common decencies of human creatures.

Is it not almost impracticable for a decent and respectable woman coming into such a district to maintain that propriety of demeanour and cleanliness to which she may have been accustomed in the country?——It is quite impossible. A short time ago I was standing in one of the streets branching off from Rosemary-lane, called Blue-anchor-yard, looking at a stream of abomination that was flowing down from a court into the open gutter in the centre of this Blue-anchor-yard, the open gutter being the common receptacle for the filth from the houses. This noisome stream was flowing close to a house, at the door of which there stood a woman with ruddy cheeks, neatly clothed. "Five times this very day, Sir," said she to me, "have I swept this place as clean as I possibly could; but you see the state in which it is again. It is no use to try to

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keep it clean." Her whole appearance indicated that she was a new comer; in a few days she would naturally give up her hopeless attempt to keep the place clean, and if she remain there she must necessarily sink into the state of squalor and filth so general among her neighbours.

Are there any schools in the districts for the poor children to go to?——There are some large schools to which a good deal of attention is paid.

Do you at all think that the good education they there receive, and the moral lessons they are taught, are neutralized by the bad habits into which they fall at home?——They are in school a few hours; their life may be said to be spent in these wretched places: the practical education they receive at home must necessarily have a far greater influence in forming their character and habits than the formal and technical instruction they receive at school.

So that the neglect of provisions for the improvement of the parents neutralizes very much any efforts made for the improvement of the children?——There is a powerful influence in constant operation counteracting the occasional efforts made for their moral improvement.

Does the want of a decent and cleanly house for the men, when they come home, produce any effect on their habits?——The moral influence of filth and discomfort has never been sufficiently attended to. That influence is in the highest degree anti-social. The wretched state of his home is one of the most powerful causes which induces a man to spend his money on strictly selfish gratifications: he comes home tired and exhausted; he wants quiet; he needs refreshment: filth, squalor, discomfort in every shape, are around him; he naturally gets away from it if he can.

Amongst those domestic jars and disputes, and the neglect of those provisions for cleanliness and decency, you say a very large proportion of children is constantly brought up?——A very large proportion.

You have stated that from thirty to forty patients per day have occasionally applied of late for accommodation in the Fever Hospital, who could not be received for want of room?——That is not usual; but it has been so during the height of the present epidemic.

Do you know what became of them?——They were applications chiefly from the parishes, a considerable number of which are in a sort of relation with the Fever Hospital. The parish gives an annual subscription to the hospital, and in return the hospital takes in a certain number of their fever cases. Most of the applications to the hospital to which I have alluded were through the medium of the parish officers, who desired to find a place for some of their people.

Then, in the event of their not being received into the Fever Hospital, they would remain in their own houses, and in that case

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would be attended to as out-patients?——In most cases they must have been attended in their own houses as out-patients; for I apprehend the workhouses in general are destitute of any adequate accommodation for them.

They would not be transferred to other hospitals?——Other hospitals would not take them in.

Is it the case in all the London hospitals, that they do not take in fever patients, except in a hospital expressly devoted to them?——At one time most of the general hospitals absolutely refused to take in fever cases, from the apprehension that the fever would spread among the other patients. That apprehension is wearing off, and the hospitals in general are relaxing a little now, so that a certain proportion of fever cases are admitted; still I think they are admitted reluctantly, and in no great numbers.

It is a fact, however, that patients are occasionally taken into other hospitals?——Certainly.

When they are attended in their own houses, what is the system of medical relief given?——Then they are attended by the surgeon regularly connected with the parish.

Does he attend personally every case?——I believe every case is understood to be under his charge.

Is he not often assisted by apprentices?——I suppose he is.

With respect to the attendance of such cases at home, and also in the hospitals, do you consider that the persons who wait upon the sick, and who have to follow out the directions of the medical man, are in general well qualified for their office?——I am not aware that there are any nurses in the pay of the parish, who attend on the sick poor, receiving out-door relief at their own homes: if there is any such practice it has not fallen under my observation. With respect to hospital nurses, we find it difficult at the Fever Hospital to get good nurses, and I am afraid the generality of nurses in hospitals are not such as the medical men can place much confidence in.

Are they sufficiently observant to manage the ventilation of a ward?——No; they are not to be trusted with that, nor anything else which requires the exercise of judgment: in general they are grossly ignorant of their real duties, and some of them have very bad habits.

Is their pay low, considering the risks they run?——Very low.

So that it is impossible to get them from a class of women well brought up and trained?——It is so difficult, and the want of nurses from a better class of women has been so strongly felt, that a society has been formed for the express purpose of inducing more intelligent and instructed women to devote themselves to the office of nursing.

What is the name of that society?——It is called, I think, the "Nursing Sisters," and is entirely under the management of a society of ladies. Some of the women who have engaged to

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devote themselves to this important duty, as the business of their future life, have gone to the general hospitals to receive the necessary instruction; and I have been informed that some of the physicians and surgeons have taken particular pains to teach them. Certain it is that they are much more intelligent, conscientious, and trustworthy than ordinary nurses. I have had several opportunities of observing this in private practice, as well as in a public institution, of which I am one of the physicians, called the Sanatorium, which is a club-house appropriated to sickness for the middle classes. Not only the comfort, but sometimes even the life of the patient, depends on careful and intelligent nursing; and I have therefore always regarded the idea which led to the formation of the Nursing Sisters' Society as a very happy one; and I should rejoice to see it encouraged by the public, so that it might be able to supply both the public hospitals and private families with such nurses as it has afforded some specimens of. Still I am bound to say that even among the common hospital nurses I have found some very kind, conscientious, and trustworthy women; but I cannot say this of the class.

You mentioned that fever often took place, sometimes in one district and sometimes in another. Are you aware whether the districts you refer to are subject to local visitations, as the wind blows in different directions, sweeping the vitiated atmosphere from one to the other at different seasons?——Every now and then we meet with a positive and precise fact, which shows that fever prevails in a neighbourhood, just as the wind blows from an infected place in the direction of that neighbourhood, and that the production of any new cases of fever entirely ceases as soon as the wind shifts. Many most instructive observations of this kind are on record, and I have given one or two examples of them in the Report alluded to; but a large and crowded town does not afford favourable opportunities for such observations. What we more commonly observe in the metropolis is, that when once fever breaks out in one of the districts we have been speaking of, it continues to rage there during the prevalence of the epidemic; it does not spread in any very clear and remarkable manner to an adjoining district, but runs over it and breaks out in a distant one.

As in cases of cholera?——Very much so. Still experience too abundantly shows that when fever prevails in any one district no place is safe; it sometimes breaks out unexpectedly in the best families residing in the large and open squares, and although such squares are not its common abode, they are by no means exempt from its visitations.

Referring to your great and constantly increasing experience as to causes of the prevalence of diseases among the humbler classes, have you observed any alteration or aggravation in the degree of fever of late as compared with former years?——The change is so great and striking that I can only express it by saying, it is a new disease.

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The fever which prevails everywhere in the metropolis now is totally different from that which I was accustomed to see for a long series of years; it is as different in its symptoms, and requires as opposite remedies as any two diseases in the catalogue of nosology.

Would you ascribe the present aggravation, as compared to the formerly existing types of fever, to the increase and augmentation of the evils under which the poorer classes labour?——I can hardly venture to say that. Of the cause which has produced the change I cannot venture to predicate anything; I can only state the fact itself. It is, however, a law of epidemics that a certain type prevails for a number of years. This type sometimes gradually, and at other times suddenly, disappears, and gives place to a type so different as to constitute a new disease: this new type in its turn gives place to a third, and so on for a long series of years. These changes, notwithstanding their apparent capriciousness, must of course depend on fixed and determinate causes, but those causes have not been ascertained. Of the nature and extent of the change which has taken place in the present instance, I may, in some measure, enable the Commissioners to judge by this circumstance. Formerly there was scarcely a day in which it was not necessary to take blood from some of the patients in the hospital; the inflammatory nature of the disease was the obvious and prevailing one, and blood-letting was indispensable to stop the progress of active inflammation in some vital organ. Now no case presents itself with any indication of active inflammation, and blood-letting is practised in the hospital scarcely four or five times in the year. Formerly wine, brandy, ammonia, anything in the shape of stimulus, was found to aggravate the disease, and was never prescribed excepting in cases attended with unusual prostration, or in the last stage of the malady: now the prostration is from the first so urgent that there is no case which requires any treatment at all that does not stand in need of stimulants; and such remedies at present often save life, whereas before they would probably have destroyed it; and this arises from a total change in the character of the disease.

As well as a deterioration, perhaps in the general condition of the health of the poorer classes before they are seized with disease?——Any deterioration in the physical condition of the poorer classes would not only make them more liable to be attacked by this disease, but would render the disease more severe and fatal; whereas the better they are fed and the warmer they are clothed, the greater is their resisting power.

So that in proportion to the debilitating causes to which the poor are subject, before they are attacked with this disease, its severity, when it does attack, would be increased?——Just so; whatever may be the cause, the fact is certain, that at the present time an epidemic is prevailing, which lays prostrate the powers of life more rapidly and completely than any other epidemic that has appeared for a long series of years.

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The change you speak of in the type of the prevailing epidemic renders it still more incumbent than the means you refer to, which may operate as checks to its extension, should be employed?——Yes, attention to the sanatory state of the country, and particularly to the condition of the localities in which the poor reside, at all times important to the public safety, is now peculiarly necessary.

Is the prevailing epidemic particularly fatal?——The rate of mortality is unusually high.

You have attached considerable importance to the subject of sewage, so much so as to state that you would be able to indicate the fever localities by the presence or absence of sewage. Do you mean by that to assign as a principal cause the absence of sewage, not, of course, saying it is the sole cause?——I conceive the immediate and direct cause of fever to be a poison generated by the decomposition of animal and vegetable matters. It is only by a system of good and general sewage that the animal and vegetable refuse, which there must always be wherever there are human beings, and the quantity of which must, of course, be great in proportion to the number of persons that are congregated together, and therefore must always be the largest in the largest towns, and in the most densely-populated parts of those towns, can be removed before putrefaction takes place, and consequently before the poison of fever is matured and diffused. Hence the rapid and complete removal of this refuse matter, which it is the object of sewage to effect, is the primary and fundamental means of preventing the production of fever; without this all other precautions must be vain; and next in importance to this is ventilation; both because currents of air are to the poisonous gases, when generated, what the sewers are to the solid matters from which the gases are produced—that is, the great means of carrying them off; and because the free admixture of pure air with poisonous gases, by diluting them, renders them innoxious.

The want of general regulations which you state to exist in many parts of the metropolis in regard to building regulations, as regards sewage and cleansing, and the supply of water, applies equally to many other large towns?——Yes, fully.

Are you of opinion that the same necessity exists for the same remedial measures in the same or a proportionally great degree in every other large town in the kingdom?——I think the evidence now accumulated and recorded of that is perfectly indubitable.

And that for the sake of improving the health, moral conduct, and comfort of the poor, such remedial measures are absolutely necessary?——Absolutely.

Do you think that the same results would occur in point of economy as in those districts you have referred to in the early part of your evidence?——Certainly.

Are you personally acquainted with any populous district besides that of London?——I have seen something of Manchester, Liverpool, Edinburgh, and Glasgow.

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Are you acquainted with the description given of these districts by those who have personally inspected them?——I have read with great attention all the Reports returned to the Poor Law Commissioners from physicians, surgeons, assistant-commissioners, and others, on the sanatory condition of the labouring population in different parts of England, Scotland, and Wales.

What is the impression made upon your mind from these accounts with regard to the sanatory condition of the provinces as compared with that of the metropolis?——I find the description given of the state of the provinces to be everywhere very similar to that of the metropolis. In some places, indeed, the state of things is worse than in the worst parts of London, as in Liverpool and Glasgow.

You are aware that in Liverpool there are many cellar-dwellings within close courts, where the entrance is under an arch, where there is no access for the air besides?——I know the fact; and my only wonder is that the human frame should be able to resist such causes of disease and death so long.

You are aware that disease is very prevalent in those districts in Liverpool?——I am.

Do you know that the number residing in cellar-dwellings in Liverpool is 40,000, and that the number residing in close courts is upwards of 60,000?—— So I understand.

You think that in those large towns, as well as in London, it is absolutely necessary that improvements should be carried out?—— Sanatory regulations are as necessary there as here: the evils are not local but general. Whatever regulations are made for one part of the country should therefore be made for all, as far as it may be found practicable to devise measures which can be carried out in all. I should rejoice to see the present prevalent system of separate local acts abandoned. If there are certain regulations which are required for the whole country, and of this every fresh inquiry affords additional evidence, then such regulations should be made universal; and if local acts are retained at all, their enactments should consist of regulations specially adapted to each respective locality, in accordance with the great general regulations, and subservient to giving practical effect to them.

From your acquaintance with the humbler classes in those neglected districts, are you of opinion that their conduct with respect to industry and regularity of deportment, and that their connexion with the commission of crimes of various kinds, is the same as it would be if they were well off and were well attended to; or that an additional expense in police regulations is required in consequence of the present state of things?——It is remarkable that the districts of which we have been speaking are not only the seats of disease, but the great seats of crime. I mean these places are the haunts and abodes of the great criminals; so that the seats of the most terrible diseases and the abodes of the great criminals of the country are identical. The worst place I know in the parish of Whitechapel is the place where the most dishonest and profligate portion of the population lives.

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Do you think that neglect of decency and comfort is likely to render those persons reckless of consequences, and inclined to a mode of getting their living dishonestly?——The neglect of the decencies of life must have a debasing effect on the human mind; and hopeless want naturally produces recklessness. There is a point of wretchedness which is incompatible with the existence of any respect for the peace or property of others; and to look in such a case for obedience to the laws when there is the slightest prospect of violating them with impunity, is to expect to reap where you have not sown.

Will you state any of the circumstances which have occurred to yourself as bearing on the question of remedies which you consider most important?——If it is the wish of the Commissioners that I should state any opinions I have formed with regard to remedial measures, I am prepared to offer a few suggestions which have occurred to me in the progress of inquiries which have now occupied my mind for a considerable time.

The Commissioners will be happy to hear any suggestions which your experience may enable you to offer on points coming within the power of the Commission.—In any legislative provision with respect to drainage, I wish particularly to direct attention to the importance of making such regulations as shall secure the proper construction of drains. I suppose the question of the paramount necessity of adopting some general measure for drainage to be settled. I take it for granted that the overwhelming evidence which has been adduced to show how much the health and even the life of the community depend on this, has entered into the legislative mind as it has into the public mind. Then, if any general measure enforcing drainage be contemplated, it is of the last importance that the enactments should be such as will really secure the end in view; and that they should not be such as will add to the evils they are intended to remove.

Will you state the result of any observation and consideration of your own on this subject?——The great principle in regulating the construction of drains appears to me to be to make such provisions as will secure their being really conduits, not reservoirs—pipes, through which the refuse matter is carried away, not receptacles in which it is deposited and detained.

Have you any observations to make as to the means of accomplishing this object?—Experience has shown that this object, namely, the complete and rapid transmission of noxious matters, may be materially facilitated by giving to the bottom of the drains a particular form, that is, a semi-circular form, instead of making them with flat bottoms.

Have you any observation to make as to the importance of pro-

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viding for drains an abundant supply of water?——Yes, it is quite obvious that it cannot matter in the least what pains are taken with the construction of the drain, so as to give to it the form, the diameter, the fall, and so on, which scientific observation may show to be the most effectual—it is plain that all this must be useless, and that all the cost of making it must be entirely wasted, if it is not amply supplied with water. No drain can be efficient through which there do not flow currents of water. If, in any particular case, it be not practicable to cause a current of water to be constantly flowing through a drain, then contrivances must be adopted to cause currents to flow through it, at regular and no distant intervals. Without a provision for this regular and abundant supply of water, drains not only fail in accomplishing their object, but they become positively injurious. They generate and diffuse the very poison, the formation of which it is their object to prevent. When the animal and vegetable matters contained in a drain are not regularly and completely washed away, they become stagnant; a deposit is regularly formed; the matters constituting this moist and semi-fluid deposit are placed under circumstances highly favourable to their decomposition; at regular distances along all the great thoroughfares, close to the pavement, and opposite the doors of dwelling-houses, are placed gully-holes, most conveniently situated for the regular escape of the poison as it is formed. In this manner a drain may become at once a laboratory in which poison is generated on an immense scale, and a conduit by which it is effectually spread abroad; and the extent to which at present poison is actually thus generated and carried forth may be accurately measured by every inch of drain which is not regularly washed by a good stream of water.

Have you met in your own practice with any instances of mischief occasioned by the escape of noxious gases from the sewers in the streets and houses?——I have been struck with the number of cases of fever in houses opposite gully-holes. I have observed that when fever once attacks any one member of a family in such a situation, it commonly attacks several individuals, and that the disease is generally severe—that is, it becomes in its progress typhoid.

Do you think this is common?——It is certain that other medical men have made similar observations. I remember one of the medical witnesses, examined by the former Committee on the Health of Towns, states that of all cases of severe typhus he had seen, eight-tenths were either in houses in which the drains from the sewers were untrapped, or which, being trapped, were situated opposite gully-holes.

Can you give any instances in support of this statement?——Instances are recorded in which servants, sleeping in the lower rooms of houses so situated, are invariably attacked with fever. We have constantly coming to the Fever Hospital servants from

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good families who have slept in such rooms, often no other member of the family having been attacked. Instances are adduced where it had been found necessary either to trap or to remove gully-holes in the vicinity of butchers' shops, to avoid the injurious effects of the effluvia upon the meat.

Then you regard an abundant supply of water as an essential part of a good system of house and street-drainage ?——So essential, that without it not only is no good done by a drain, but the very evil intended to be avoided is positively increased and extended —it may be, on a large scale. I wish particularly to direct attention to the importance of the plan adopted in the Holborn and Finsbury Divisions, of flushing the sewers, and of carrying off all the refuse by water. The Commissioners are aware that in this district cast-iron flushing-gates are fixed in the sewers; the ordinary flow of water accumulates at these gates; the gates are opened, and the force of the water is sufficient to sweep off the deposit. It is stated in evidence by the inventor of this plan, Mr. Roe, a civil engineer, who has a large experience on these matters, that in the sewers constructed and managed in the common way, great accumulations of deposit take place; and that from the sewers containing the refuse that was at one time deposited in the cesspools, this deposit is now more noxious than it was formerly, the noxious gases generated being more considerable, and escaping more extensively into streets and houses where the drains are not well trapped. It appears that in one set of sewers this deposit is allowed to remain about five years, and in another about ten years: all this time the public are exposed to the poison sure to be evolved from the decomposing accumulation. Moreover, when these accumulations in the sewers reach a certain point, the private drains are choked; then the foul state of the main-sewer becomes manifest, and the individuals, whose drains are stopped are put to great annoyance and expense. Now, all this is so much mischief and expense gratuitously inflicted upon the public: it might be avoided by this system of flushing the sewers.

Do you think it practicable to carry off by such a system the refuse of the streets, if swept into the sewers ?——Yes; there appears to be no difficulty whatever in this, provided only there be a good sewer, proper gully-holes and shoots, and an ample supply of water. The street-sweepers at present always do sweep whatever they can into the gully-holes, and where there is a good supply of water it is found that everything is carried away without inconvenience.

Have you paid any attention to the value of refuse matter considered as manure, and to the practicability of so ordering things as to make this manure repay in some degree the cost of removal? ——Yes, I have been very much struck with the evidence that has been collected on this subject, which appears to me to be so important as to deserve the most serious attention. I own that I

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have been unable to detect any fallacy in it, and I cannot but regard it as affording a well-grounded hope that the means of putting every town and village in the kingdom in a good sanatory state, and of removing the grievous physical evils which at present oppress them, and especially the poorer parts of them, are within our reach. When, for example, it is stated that refuse to the value of nearly double what is now paid for the water of the metropolis is thrown away, partly from the drains which are sewered into the Thames, and partly from the private drains which are not sewered at all; it is clear that the prevention of the disease, suffering, and death, which, it has been shown, oppress such large classes of our population, is quite practicable; and that if measures are not taken to stop these dreadful evils, it is owing not to any insuperable difficulty in the subject, but to our own apathy and indifference.

You think, under proper regulations, it would be found practicable to make the very refuse removed go far towards defraying the expense of constructing and managing the drains and sewers by which it is removed?——Yes; and I think there is a reason for this expectation which has a deeper foundation than is apparent on a superficial view of the subject. There are certain adjustments established between the physical and the organic kingdoms, and between the two great divisions of the organic kingdom, which we should do well to bear in mind even in the most practical consideration of this matter. We know that atmospheric air is equally necessary to the life of plants and animals, but that they produce directly opposite changes in the chemical constitution of the air: the plant giving off as excrementious that principle of the air on which the animal subsists, and living upon that part of it which the animal rejects as excrementitious; while the animal, in its turn, restores to the air the principle which constitutes the food of the plant, and subsists on that which the plant has rejected as no longer useful to it. In this manner these two great classes of organized beings renovate the air for each other, and everlastingly maintain it in a state of purity and richness. On this beautiful adjustment depends this further principle, equally at the foundation of all rational and efficient sanatory regulations—namely, that the very refuse of the materials which have served as food and clothing to the inhabitants of the crowded city, and which, if allowed to accumulate there, invariably and inevitably taint the air, and render it pestilential—promptly removed and spread out on the surface of the surrounding country, not only give it healthfulness, but clothe it with verdure, and endue it with inexhaustible fertility. These are great laws of nature which are now well known to us; a due conformity with which would bring us health, plenty, and happiness, but which we cannot disregard any more than we can disregard any other physical law without suffering, and perhaps destruction. Do we act in conformity with these laws? I turn to the Report on the Sanatory Condition of the Labouring Population, and I find the following account of the actual state of things:—"Within the town we find the houses and streets filthy, the air fœtid; disease, typhus, and other epidemics rife amongst the population; bringing in the train destitution, and the need of pecuniary as well as medical relief; all mainly arising from the presence of the richest materials of production, the complete absence of which would in a great measure restore health, avert the recurrence of disease, and, if properly applied, would promote abundance, cheapen food, and increase the demand for beneficial labour. Outside the afflicted districts, and at a short distance from them, as in the adjacent rural districts, we find the aspect of the country poor and thinly clad with vegetation, except rushes and plants favoured by a superabundance of moisture, the crops meagre, the labouring agricultural population few, and afflicted with rheumatism and other maladies, arising from damp and an excess of water; which, if removed, would relieve them from a cause of disease, the land from an impediment to production, and, if conveyed for the use of the town population, would give that population the element of which they stand in peculiar need as a means to relieve them from that which is their own cause of depression, and return it for use on the land as a means of the highest fertility. The fact of the existence of these evils, and that they are removable, is not more certain than that their removal would be attended by reductions of existing burthens, and might be rendered productive of general advantage, if due means, guided by science, and applied by properly qualified officers, be resorted to." If there be any truth in these statements, it is surely worth while to consider how far it may be practicable to lessen the present heavy expense of drainage, and what means are at our command of turning the refuse matters to account, so as partly, at least, to defray the necessary cost of drainage.

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How do you think the expense of drainage might be lessened?——By draining, on a well-considered plan, on a large scale, as in districts, and under the superintendence of skilled and responsible officers. The evidence collected to show, both how much better the work would be done in this way, and at how much less cost, appears to me to deserve great attention.

Have you any observation to make as to the distribution of the expense?——I think that the expense should not fall exclusively on the present occupier or owner, but that the repayment of the sum to be raised should extend over a long term of years. With a proper distribution of the cost, the burthen would not press with severity on any individuals. This, too, is a case in which posterity would be equally benefited with the present generation, and there is, therefore, no injustice in charging on them a share of the cost. It has, I think, been fully proved, that the means which science gives of cheapening the cost of conveyance of refuse from houses might be rendered available for extending and completing the cleansing of towns, removing the filth which oppresses the poorer

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districts, and rendering the whole of it available in the best form for future use as manure.

Do you think any material saving could be made in the present cost of street-cleansing?——It has been shown that two-thirds of the annual expense of street-cleansing is the expense of cartage, which a proper adaptation of the sewers would render wholly unnecessary: the refuse of the streets might be removed in the same way as the refuse of houses—namely, through pipes by means of water. This is proved to be the most rapid, cheap, and convenient mode of removing the refuse from houses: in like manner the refuse of streets might be swept at once into the sewers and discharged by water. Experienced engineers state that, whenever the levels are not convenient, or whenever it is desirable to send the refuse over heights for distribution, the contents of the sewers may be lifted by steam-power, just as water is lifted in the drainage of the fens; and it might be sent for distribution wherever it is required for use in iron pipes, in the same manner as water is conveyed into towns by the water companies. The estimated expense of this mode of cleansing and removal is about the same as that of conveying water into towns—that is, not a tithe of the expense of cartage. I was struck with the following application of this principle:—" A contract was about to be entered into by the West Middlesex Water Company for hauling out from their reservoir at Kensington the deposit of eight or ten years' silt, which had accumulated to the depth of three or four feet. The contractor offered to remove this quantity, which covered nearly an acre of surface, for the sum of 400*l.*, in three or four weeks. The reservoir was emptied in order to be inspected by the engineer and directors before the contract was accepted. It occurred to one of the officers that the cleansing might be accomplished more readily by merely stirring up the silt to mix it with the water; and then, if a cut or outlet were made in the main-pipe used for conveying the water to London, that it might be washed out. He accordingly got thirty or forty men to work in stirring up the deposit, and accomplished the work at the cost of 40*l.* or 50*l.*, and three or four days' labour, instead of so many weeks; when the directors went to see the basin to decide upon the contract, the reservoir was as free from any deposit as a house-floor. Since the discovery thus made, the silt has been regularly cleansed out into the common sewers. It is to be observed, in respect to the relative cheapness of the two modes, that the contractor would only have removed the silt to the nearest convenient place of deposit in the immediate vicinity of the reservoir; whereas, in the fluid state, it might be carried at the actual cost of conveying water, as far as it is at present conveyed, and sold with a profit, twelve or fourteen miles, and raised to heights of 150 feet, at 2½*d.* per ton."

How far do you think the legislature may safely interfere in the building of dwelling-houses, with reference to sanatory regulations?

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——The legislature has already sanctioned and acted on the principle of interference in the building of dwelling-houses; having made special provisions for their strength, and taken special precautions with a view to diminish the danger of fire, but hitherto it has taken no manner of account of their sanatory condition. Now it is certainly right that no house should be allowed to be built in so imperfect a manner as to be insecure, and that precautions should be taken against the ready communication of fire: but the preparation of the ground on which a house is to be built, so as to afford the degree of dryness requisite for a human dwelling, and the construction of the house in such a manner as to admit of the necessary supply of water, and the easy removal of refuse matter, are just as important as that the walls of the house should be of a certain thickness, and should be constructed with special precautions against the ready communication of fire: indeed, that a house should be well drained, and capable of being kept clean, is even more necessary for health than the other regulations are for safety; and the public interest requires that both should be alike under legislative regulation.

Do you think the construction of the dwelling-houses for the humbler classes requires legislative regulation as well as for the dwelling-houses of the higher classes?——The poor, in general, are too ignorant and too apathetic to take proper care of themselves, even in matters which far more obviously concern their interests than the construction of their dwelling-houses. The classes which live in the most wretched hovels complain the least of their condition, which will never be bettered until the more instructed interfere to improve it; but were they ever so well informed, and anxious to bring about a better state of things, they have no power to effect any change. They must be near their work; and their poverty will induce them to take the cheapest houses they can obtain closest to their place of work.

Are the small landlords regardful of the sanatory condition of their tenements?——In the former Parliamentary Inquiry on the Health of Towns abundant evidence was collected to show that the smaller landlords obtain proportionally the highest rents, and that they are most unscrupulous with regard to the condition of the houses let to the poor tenants. Every reason, therefore, which has placed the construction of their dwelling-houses of the better classes under legislative regulation, or which can be suggested to show the justice and necessity of legislative interference in this matter, for the well-being and security of the public, apply with tenfold force to the dwelling-houses of the poor.

Are you acquainted with any instances which show gross ignorance and neglect on the part of these small landlords?——One remarkable instance of it, among several others, came to my knowledge during my personal examination of the state of Bethnal-green. I found there a small court, called Shepherd's-court,

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consisting of about six houses. Fever had prevailed to a great extent in this court; in one particular house several cases of fever had occurred in succession. The house in question is small, containing four rooms, two on the ground-floor, and two above, each of these rooms being let out to a separate family. On the present occasion in one of the rooms on the ground-floor there were four persons ill of fever; in the other room, on the same floor, there were, at the same time, three persons ill of fever; and in one of the upper rooms there were also, at the same time, three persons ill of fever; in the fourth room no one was ill at that time. The parish surgeon found that different families had in succession occupied these rooms, and become affected with fever: on his representation of the case to the parish officers, all the sick were removed from the house as soon as possible. No remonstrance on the part of the parish authorities could induce the owner of the house to cleanse and whitewash it, or to do anything to put it into a state of greater safety. An order was made by the Board of Guardians to take the case before the magistrates at Worship-street. The magistrates at first refused to interfere; they said they had no authority to interfere; but the medical officer stated that several cases of fever had occurred in succession in this particular house; that one set of people had gone in, became ill with fever, and died; that another set of people had gone in, and been, in like manner, attacked with fever, and died; that this had occurred several times, and that it was positively known that this house had been affected with fever for upwards of six weeks before the present application was made. On hearing this the magistrate sent for the owner of the house, and remonstrated with him for allowing different sets of people to occupy the rooms without previously cleansing and whitewashing them; telling him that he was committing a serious offence in allowing the nuisance to continue. They could not induce him to undertake to adopt any measures for the improvement of the condition of the house. The magistrates then gave the house in charge to the medical officer, authorizing him to see all the rooms properly fumigated, and otherwise thoroughly cleansed; and stated that if any persons entered the house before the medical officer said that the place was fit to be inhabited, they would send an officer to turn them out, or place an officer at the door to prevent their entrance. The landlord became frightened, and allowed the house to be whitewashed, fumigated, and thoroughly cleansed. Since this was done the rooms have been occupied by a fresh set of people, but no case of fever has occurred. The magistrates, however, were understood to have, at that time, no authority to interfere as they did; and this case, I believe, led to the introduction of a clause in the recent Metropolitan Police Act, by which authority is given to the magistrates to interfere in any similar case; but, unfortunately, this provision in the Police Act throws the expense of cleansing, and so on, on the occupier, not the

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owner,—so that the landlords are still as exempt as ever from all legal obligation to keep their tenements in a state compatible with the preservation of the health of their tenants.

Are there any practical regulations applicable generally to the dwelling-houses of the humbler classes which in your opinion require to be enforced by the Legislature?——Yes; there are two regulations which appear to me to be of paramount importance and of universal application, and in the enforcement of which I see no practical difficulty. The Legislature should prohibit, under adequate penalties, the letting of any house as a dwelling-house in which water is not laid on, and to which there is no privy sufficiently screened from view. A good supply of water for domestic purposes, and privies concealed from view, and so constructed as to admit of being easily kept clean, are absolutely essential to the preservation of the public health and morals; and, as experience has too fully shown that these accommodations will not be given generally to the houses of the poor without legislative regulation, it is the duty of the Legislature to interpose its authority to secure them. I have already more than once expressed my conviction (but it is my sense of the importance of the subject which makes it recur so frequently to my mind, and this perhaps may in some degree excuse the repetition), that the humanizing influence of habits of cleanliness, and of those decent observances which imply self-respect, the best, indeed the only, real foundation of respect for others, has never been sufficiently acted on. A clean, fresh, and well-ordered house exercises over its inmates a moral, no less than a physical, influence, and has a direct tendency to make the members of the family sober, peaceable, and considerate of the feelings and happiness of each other; nor is it difficult to trace a connexion between habitual feelings of this sort and the formation of habits of respect for property, for the laws in general, and even for those higher duties and obligations, the observance of which no laws can enforce: whereas a filthy, squalid, unwholesome dwelling, in which none of the decencies common to society, even in the lowest stage of civilization, are or can be observed, tends directly to make every dweller in such a hovel regardless of the feelings and happiness of each other, selfish and sensual; and the connexion is obvious between the constant indulgence of appetites and passions of this class, and the formation of habits of idleness, dishonesty, debauchery, and violence; in a word, the training to every kind and degree of brutality and ruffianism. This is what any man who has at all turned his attention to the subject would expect; and a demonstration of its truth appears to me to be afforded by the fact already stated, that in the worst districts of which we have been speaking, and in the most wretched of the hovels in these neglected districts, live, and from birth have lived, that portion of the population out of which come not only the pickpockets, the thieves, and those other degraded and profligate persons who constitute the ordinary pests of society, but also in general

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our great criminals, violent and reckless men, who every now and then perpetrate in cold blood, with a savage callousness, deeds which fill the whole country with disgust and horror.

Do not the humbler classes require even greater facilities for cleanliness than the wealthier?——Yes; it happens, unfortunately, that while the humbler classes naturally require in their localities and dwelling-houses greater helps to cleanliness than the classes above them, the former having invariably had less of these external aids than the latter. People in good circumstances, who live in good houses, in the more open and less densely populated neighbourhoods, can maintain tolerable cleanliness with fewer facilities for that purpose than the poor who live in small houses and in close and crowded localities. Yet, as a general rule, while the best class of streets are cleansed once a-week, the second class are cleansed only once a-fortnight, the third class only once a-month, and the worst class never; though of course the worst,—for the very reason that they are the worst,—ought to be cleansed daily. In like manner with regard to dwelling-houses, it is the smallest and the least convenient that have no water laid on, that are without privies, and that are wholly destitute of every other means of removing excrementitious and noxious matter.

Did you find in the district which you personally inspected many houses in which water is not laid on the premises for domestic purposes, and in which there are no privies?——In Bethnal-green there are whole streets in which there is not a single house with water laid on the premises; in some parts of this district, for the use of the houses of several streets, for example, for all the houses in Cranbrook-street, Old Ford-road, Charlotte-street, Grosvenor-place, and Twigg Folly, there are but two pumps: in one crowded part of this district I found the poor inhabitants deprived of water altogether, because the owner of the houses had had some quarrel with the water company, and the water company had wholly stopped the supply of water. It is fortunate that air is more accessible than water, and that its supply does not depend on landlords and water companies; but water is as indispensable for many purposes of life as air is for life itself, and its supply ought not to be allowed to depend on the cupidity or caprice of landlords and water companies, but ought to be made compulsory on whoever invests his capital in dwelling-houses.

You found many houses without privies, and the privies which are common to several houses in a deplorable state of filth?——Great numbers of houses are without privies; and that some conception may be formed of the state of the common privies I may recall attention to the description which I wrote on the spot; for example, of Punderson's-gardens and Lamb's-fields. "The place called Punderson's-gardens is a long narrow street, in the centre of which is an open sunk gutter, in which filth of every kind is allowed to accumulate and putrefy. A mud-bank on each side commonly

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keeps the contents of this gutter in their situation; but sometimes, and especially in wet weather, the gutter overflows; its contents are poured into the neighbouring houses, and the street is rendered nearly impassable. The privies are close upon the foot-path of the street, being separated from it only by a pailing of wood. The street is wholly without drainage of any kind. Fever constantly breaks out in it, and extends from house to house; it has lately been very prevalent here, and we have had several fatal cases from it in the London Fever Hospital. The open area called Lamb's-fields is about 700 feet in length and 300 feet in breadth; of this space about 300 feet are constantly covered with stagnant water, winter and summer. In the part thus submerged there is always a quantity of putrefying animal and vegetable matter, the odour of which at the present moment is most offensive. An open filthy ditch encircles this place, which, at the western extremity, is from eight to ten feet wide. Into this part of the ditch the privies of all the houses of a street called North-street open; these privies are completely uncovered, and the soil from them is allowed to accumulate in the open ditch. Nothing can be conceived more disgusting than the appearance of this ditch for an extent of from 300 to 400 feet; the odour of the effluvia from it is at this moment most offensive. Lamb's-fields is the fruitful source of fever to the houses which immediately surround it, and to the small streets which branch from it. Particular houses were pointed out to me from which entire families have been swept away; and from several of the streets fever is never absent." A part of this place has been improved since this description was written, by the cuttings of the Eastern Counties Railway, which passes through it; but the offensive ditch, with the exposed privies emptying into it, remain just the same. I know that no verbal description of these places can convey any conception of their disgusting and poisonous condition; they must be seen to be at all understood, and when seen every one involuntarily exclaims, "Can such a state of things exist in a country that has made any progress in civilization!" These places had remained in this state many years, and no one had made any attempt to improve them; and now, after an account of their condition has been published to the world upwards of five years, they are allowed to remain just the same!

Are there any further observations which you have to offer relating to the dwelling-houses of the poor?——I wish particularly to draw attention to the importance of having a certain number of rooms in the dwelling-houses of the poor, though I am aware of the difficulty of legislating on this matter, and of the still greater difficulty of carrying out practically what the Legislature may declare to be its intention and will. Still it is right that the attention of the public and of the Legislature should be called to the physical deterioration, and the moral degradation, which result from the want of proper room in the dwelling-houses of the poor. Besides the evidence on

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this subject which has been published in the Report on the Sanatory Condition of the Labouring Population, a large mass of evidence to the same effect will be found in the Reports of the Sub-Commissioners under the Children's Employment Commission, and in the statements of great numbers of witnesses examined by them. Instances such as the following are given:—"A mother and her son, being an adult, sleep in the same bed. Grown-up females and unmarried young men sleep in the same room. A man, his wife, and his wife's sister, the latter being an adult, sleep together in the same bed." I have myself seen a young man, twenty years of age, sleeping in the same bed with his sister, a young woman sixteen or seventeen years old. That incestuous intercourse takes place under these circumstances there is too much reason to believe; and that when unmarried young men and women sleep together in the same room, the women become common to the men, is stated in evidence as a positive fact; but I regard another inevitable effect of this state of things as no less pernicious; it is one of the influences which, for want of a better term, may be called *unhumanizing*, because it tends to weaken and destroy the feelings and affections which are distinctive of the human being, and which raise him above the level of the brute. I have sometimes checked myself in the wish that men of high station and authority would visit these abodes of their less fortunate fellow-creatures, and witness with their own eyes the scenes presented there; for I have thought that the same end might be answered in a way less disagreeable to them. They have only to visit the Zoological Gardens, and to observe the state of society in that large room which is appropriated to a particular class of animals, where every want is relieved, and every appetite and passion gratified in full view of the whole community. In the filthy and crowded streets in our large towns and cities you see human faces retrograding, sinking down to the level of these brute tribes, and you find manners appropriate to the degradation. Can any one wonder that there is among these classes of the people so little intelligence,—so slight an approach to humanity,—so total an absence of domestic affection, and of moral and religious feeling? The experiment has been long tried on a large scale with a dreadful success, affording the demonstration that if, from early infancy, you allow human beings to live like brutes, you *can* degrade them down to their level, leaving to them scarcely more intellect, and no feelings and affections proper to human minds and hearts.

Have you examined frequently the houses of individuals among the poor in these neglected districts?——Yes.

Have you noticed particularly the state of the air in their apartments?——I have; and it sometimes happens to me in my visits to them as physician to the Eastern Dispensary, that I am unable to stay in the room even to write the prescription. I am obliged, after staying the necessary time at the bed-side of the patient, to go into the air or to stand at the door and write the prescription;

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for such is the offensive and unwholesome state of the air, that I cannot breathe it even for that short time. What must it be to live in such an atmosphere, and to go through the process of disease in it?

Your medical attendance never can have the influence you would desire under these circumstances?——It cannot; and therefore it is that I have said, you cannot treat the diseases that are produced in these localities; for the very same causes that produce the diseases render the application of the proper remedies impracticable.

The power of vetilation being one of the most important?——Certainly; it is one of primary importance. When we consider that air is more necessary to life than food, that without a due supply of this first want of our nature no food, however excellent and abundant in quality and quantity, can sustain health and strength, and that respiration in a large bulk of air is next in importance to breathing a pure air, because it is necessary to the perfect performance of this function that the air should enter the lungs with a certain degree of force; and when we consider further that in a large town with narrow streets, with still narrower alleys, with close courts, with houses built back to back, with small rooms having low roofs, two or three families living in each of these rooms, and sometimes even in the cellars of such houses, it is obvious that every circumstance is here combined to vitiate the air, to prevent the escape of the noxious gases that are generated, and to present what little respirable air remains, in the form in which it is the least fitted to answer the purposes of respiration. When we bear these things in mind, we plainly see how impossible it would be to preserve health under such circumstances even with the best means in all other respects which wisdom and science could afford to counterbalance the disadvantage. What then must it be to live under such circumstances in the deepest poverty, without a single aid from science to counteract the evil, nay, with every aggravation of the evil likely to result from the profoundest ignorance.

So that you regard the removal of obstructions to the circulation of free currents of air in streets, and the giving to the dwelling-houses of the poor the means of good and efficient ventilation, essential improvements?——I think they are scarcely second in importance to any; and we now know that the evils arising from living in crowded places under circumstances tending rapidly to exhaust and vitiate the air, can be greatly counteracted by powerful ventilation. The means of affording such ventilation at a very moderate cost are known. After much experiment and labour, the means of affording good and cheap ventilation have been discovered, and are familiar at least to some few scientific persons, and there cannot be a doubt that under their direction a vast progress might be made towards removing the most grievous of the existing

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evils, and towards diffusing more correct knowledge on the subject, and forming improved habits with regard to it.

Taking into your consideration the circumstance of the horror of persons of cold draughts when they are sick, and when the constitution is in a debilitated state, do you think that external ventilation without the ventilation of the individual apartment will ever meet the wants of the case?——I do not.

From what you have seen of the dwellings of the poor, have you any hopes of any ventilation being successful which does not ensure the removal of the vitiated air from above the level of the head?——It is obvious that the supply of pure air externally is only the first step towards real effectual ventilation; if the air in the interior of the dwelling-house, or in the place of work, is not duly changed, little or no benefit can be derived from the purity of the external air: it is of course the state of the air which is actually and habitually breathed that influences the health. The ultimate object of ventilation therefore is to supply the interior of apartments with air in a fit state for respiration. Now the means of supplying at a moderate cost the interior of apartments with fresh air, and even with warm fresh air, and of saving thereby a vast expenditure of fuel, are, as I have just said, perfectly well known at the present moment. This is a piece of knowledge capable of effecting a a greater change for the better in the whole condition of the working population, perhaps, than any other single improvement whatever, because there is no other at all comparable to it in importance capable of so general an application at so small a cost.

You do not think that the knowledge possessed by scientific men on this subject, eminently useful as it is capable of being, is likely to be applied generally to the public advantage, without some special provision for that purpose?——I do not; I am afraid many years must pass away before such knowledge can become generally diffused among the people, nor do I see how it can ever be actually applied to their use, without some special agency for carrying it out into practice. It has been justly stated that it is only when the public health is made a matter of public care by a responsible public agency, that what is understood can be expected to be generally and effectually applied for the public protection.

You have a strong impression that certain evils pressing with peculiar force on the humbler classes, the existence of which, however, is capable of being prevented, arise from the want of ventilation. Do you not think that this is a case in which it would be peculiarly advantageous to act on the principle of prevention rather than on that of cure?——The evils arising from the want of a due supply of pure warm air can really be remedied in no other way than by affording that supply. Charity cannot cure the sickness produced by the want of pure air, and when it puts forth its utmost exertions, all that charity can do to mitigate the suffering arising from this cause is next to nothing. Large sums of money are annually contributed by benevolent persons for the relief of the sufferings of the poor—sufferings arising among other causes, from the want of ventilation. Still larger sums are annually contributed by employers for the relief of their workpeople, when sick or when superannuated—such sickness and early superannuation being often mainly caused by the want of ventilation. In some cases large sums of money, in the aggregate at least large, are raised by the workpeople themselves out of their hard-earned wages, for their own relief in sickness and when their time for profitable labour shall have passed away; a considerable portion of the working hours of every day having been lost, and the ultimate incapacity for performing any longer a good and profitable day's work having been much hastened by the neglect of the ventilation of the place of work.

You think a portion of the money thus raised would be most profitably spent in obtaining a better ventilation of the places of work?——I do. I find it stated, for example (and the description here given of one occupation, that of the journeyman tailor, is applicable to many), that in a room 16 or 18 yards long, and 7 or 8 yards wide, 80 men worked together; the men were close together, nearly knee to knee. In summer time the heat of the men and the heat of the irons made the room 20 or 30 degrees higher than the heat outside; the heat was then most suffocating, especially after the candles were lighted. "I have known young men," says this witness, "tailors from the country, faint away in the shop from the excessive heat and closeness; persons, working-men, coming into the shop to see some of the men, used to complain of the heat and also of the smell, as intolerable. The men sat as loosely as they possibly could, and the perspiration ran from them. It is of frequent occurrence in such workshops that light suits of clothes are spoiled from the perspiration of the hand, and the dust and flue which arise during the work. I have seen 50*l.* worth of work spoiled in the course of the summer season from this cause. In winter these places are still more unhealthy, as the heat from the candles and the closeness is much greater. Any cold currents of air which come in give annoyance to those who are sitting near the draught. There is continued squabbling as to the windows being opened: those who are near the windows, and who do not feel the heat so much as the men near the stoves, objecting to their being opened. The oldest, who had been inured to the heat, did not like the cold, and generally prevailed in keeping out the cold—that is, the fresh—air. Such has been the state of the atmosphere, that in the very coldest nights large thick tallow candles (quarter of a pound candles) have melted and fallen over from the heat. This state of the place of work produced a very depressing effect on the energies of the workmen. Many could not stay out the hours, and went away earlier. Those who were not accustomed to the place generally lost appetite. The natural effect of the depression was, that we had recourse to drink as a stimulant, gin being taken instead of food. I should say the

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greater part of the habit of drinking was produced by the state of the place of work, because when men work by themselves, or only two or three together, in cooler and less close places, there is scarcely any drinking between times. Nearly all this drinking proceeds from the large shops, where the men are crowded together in close rooms: it is the same in the shops in the country. In a rural place, the tailor, where he works by himself or with only two or three together, takes very little of the fermented liquor or spirits which the men feel themselves under a sort of necessity for doing in towns. The closer the ventilation of the places of work the worse are the habits of the men working in them." A large mass of evidence has been collected to show that a similar state of things prevails in other occupations. Now it appears that no inconsiderable sum is raised annually by the united contributions of the masters and journeymen in this trade, for the benevolent purpose of affording assistance to destitute workmen in sickness and old age. There is a benevolent institution for the relief of aged and infirm tailors, to which the annual subscriptions of the masters amount to 800*l.*, and the annual subscriptions of the journeymen amount to 525*l.*, making a sum total of 1,325*l.* annual subscription. This sum is distributed in the relief of sickness and of the infirmities of old age; but no contribution is raised to prevent the production of sickness and premature infirmity, by the removal of the causes of sickness and of early superannuation. Yet a comparatively small sum, expended under scientific direction, in the ventilation of the places of work would prevent sickness and retard the period of superannuation, probably to such an extent as to justify the following statement: "If," says the Report, "the employers or the men had been aware of the effects of vitiated atmospheres on the constitution and general strength, and of the means of ventilation, the practicable gain of money from the gain of labour by that sanatory measure could not have been less, in one large shop employing 200 men, than 100,000*l.* Independently of subscriptions of the whole trade, it would, during their working period of life, have been sufficient, with the enjoyment of greater health and comfort by every workman during the time of work, to have purchased him an annuity of 1*l.* per week for comfortable and respectable self-support during a period of superannuation commencing soon after fifty years of age."

Do you not consider that a material saving would be effected, even in money, by an agency which, though attended with some expense, should better provide for the public health?——I think a very moderate cost would provide for a system of supervision of the public health, which, even on the ground of economy, would be highly advantageous to the public. There must, of course, be some authority to carry out and enforce obedience to the measure, whatever it may be, on which the Legislature may decide, relative to drainage, sewage, the construction of dwelling-houses, and the provisions for supplying those houses with the means of ventilation

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and cleanliness. The body to whom the administration of such a law is intrusted, whatever its particular enactments may be, must obviously require professional knowledge, such as the peculiar knowledge of the civil engineer, the architect, and the physician. A commission combining eminent individuals, each the most eminent in his respective science, whose services could be obtained, each devoting his whole time to its business, and a part of whose duty it should be to see that the surveyors who must superintend the operations in detail are persons possessing the requisite science and practical skill, and of whose qualifications and mode of performing their work the members of a board so constituted would be competent to judge; such a commission, armed with proper authority, and responsible for its exercise, would not only enforce a general obedience to the law, but in carrying the measure into practical operation, by acting on a general and well-considered plan, by employing as agents those only who possess the requisite science and skill, and by exercising a due control over them in the execution of their work, would save the country hundreds of thousands of pounds. A general administrative body, constructed in some such manner as this, appears to me to be indispensable to the practical working of any measure on this subject which may receive the sanction of the Legislature.

Such an administrative body, you think, would be necessary to carry into effect any law which may be passed regulating drainage, sewerage, and the construction of dwelling-houses, with reference to their proper ventilation and cleanliness; but such a body could exercise no control over the public health, nor take any cognizance of it, beyond the provisions that may be included in this particular enactment?——No, and no agency for the protection of the public health can be effectual which does not provide for the regular and responsible personal inspection of the localities in which disease is most apt to arise and spread. In endeavouring to devise such an agency, it is natural, in the first instance, to inquire whether it might not be connected with some branch of the public service already established, and in extensive operation, having in it something analogous in nature and object; or at all events capable of being carried on conjointly and with mutual assistance. A suggestion to this effect, which appears to me to be deserving of notice, has been made in the Report on the Sanatory Condition of the Labouring Population, namely, that an increase should be made to the permanent local medical service, under the Poor Law Commissioners, by the appointment, in districts, of a superior medical officer, for the aid and supervision of the medical relief at present afforded to the poor. If in military hospitals it has been found necessary to appoint inspecting surgeons; and if unquestionable good to the service, in various modes, has resulted from the appointment of such officers, the necessity that there should be some supervision over such a body of men as are at present intrusted with the medical treatment of the

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poor, is still greater; and the advantages of such inspection in this instance would be of proportionate magnitude. If among such a numerous class of medical men as the parish surgeons, notwithstanding that all of them must have gone through a prescribed course of education, yet a considerable portion of whom are young, and comparatively inexperienced, there be no incompetence, no error, no neglect, still the public has at present no security of this, and it is a security to which, if it can be given, the public are entitled. The Boards of Guardians are altogether incompetent to exercise the requisite control over this large body of their officers; and there must be occasions on which the Poor Law Commissioners themselves, as well as individuals among the most conscientious, the best instructed, and the most skilful of the medical men attached to the Unions, must stand in need of the counsel and aid of a medical officer, filling comparatively a high station, and distinguished for his science and integrity. That such an officer, exercising jurisdiction over a certain district, is at present needed, few will dispute who are acquainted with the practical administration of the established medical relief; and the appointment of such an officer would, it is submitted, give unmixed satisfaction probably to the poor themselves, and certainly to the great body of medical men intrusted with their care during sickness, to the Boards of Guardians, to the Board of Commissioners, and to the public. Then each district inspector, with the aid of the general body of medical men attached to the Unions in his district, and with the assistance of the relieving officers, would become fully cognizant of the sanatory condition of his district, and would be capable of rendering invaluable service to the public, as a local officer of health. Such a superior medical man in each district, who should be required to devote his whole time to this service, and who should be responsible for the proper performance of the duties of his office, might, with the assistance of the general body of medical men under his supervision, together with the assistance of the relieving officers and the Boards of Guardians, be made to afford in various ways, highly important aid in the protection of the public health. But this service to be complete should provide not only for the regular, personal, and responsible inspection of dangerous and positively infected districts, and of the particular circumstances connected with the deaths that take place there, but even of every circumstance of a sanatory nature connected with every death that takes place, whatever the district and whatever the station of the individual. The means of securing such an inspection would appear to be simple and inexpensive, and the office might be advantageously connected with a service, the institution of which will probably prove to be a matter of absolute necessity. It seems scarcely likely that, after a mature consideration of the mass of evidence which has been collected relative to the evils that result from the present mode of interment in towns (to say nothing of the minor but still very grievous evils that result from the present oppressive charges for funerals, oppressive to all classes from

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the lowest to the highest,) the Legislature will hesitate to place this matter under some restriction and regulation. Now numerous statements are made by different classes of witnesses, such as clergymen, the better class of undertakers, and others practically acquainted with the feelings and wants of families when visited by death, that the administration of the provisions of such an Act should be given to responsible officers, and that from the nature of their professional studies, from their peculiar knowledge, their station in life, and their general character and habits, no less than from the solemnity and sacredness of the duties to be performed, it is desirable that these officers should be selected from the higher class of medical men. The first duty of such officers of health would of course be the verification of the fact of death; and in order that the officer of health may be immediately brought to the spot where any death has occurred, it has been proposed that the last medical attendant on the deceased should, on a small payment, be required to give immediate notice of the death, in a prescribed form; or in case there happened to be no medical attendant, which, however, would be a very rare occurrence, it should then be incumbent on the occupier of the house, or the person having charge of the body, to give the required notice. With a view to the protection of the public health, it is easy to see the kind and extent of service, which such a body of men would be capable of rendering. With far greater accuracy than it has ever yet been found practicable to obtain, they would ascertain the cause of death, and the circumstances connected with the operation of that cause, whether in the locality, the dwelling-house, or the particular apartment in which the deceased expired, as well as the actual condition of the survivors. Suppose the death to have occurred from an ordinary cause, then they would be able to give such counsel to the family of the deceased respecting the proper, that is, the safe disposal of the body until the period of interment, and to suggest such measures for the interment, as while it might afford no small solace and assistance to the family, and be the means of saving them much expense, might be a great security to the neighbourhood and the public. Suppose the death to have occurred from an extraordinary and occasional cause, such, for example, as some epidemic disease, after giving the instructions, and taking the measures necessary for the safety of the survivors, such officers would ascertain how far the origin of this disease, or the spread of it, or the increase of its malignity and mortality, depended on any local agency capable of removal, and would immediately give the requisite information to the proper authorities. In the regular performance of those functions, such officers would, further, materially add to the security of life, and exert a new influence in the prevention of crime, by imposing almost insuperable difficulties in the criminal disposal of a dead body, or in concealing any mark of violence upon it; while they would perform in a constant and efficient manner, certain duties which in theory are supposed to be performed by the coroner, but which in practice

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are found to escape his notice, and to be altogether beyond his cognizance. Nor will it be regarded as the least important part of the service capable of being rendered by such an instructed body of men, to whom the present local registrars might act as auxiliaries, that they would soon give to the registration that degree of accuracy and completeness which would fit it in a perfect manner for every use, civil and legislative, to which a perfect registration is capable of being applied. If it should be proved on trial that this agency is insufficient for the protection of the public health, the experience acquired by it would point out what modification of it, and what addition to it, the necessities of the case absolutely require. As a tentative course, as a mode of commencing with the simplest and the least expensive machinery, a systematic, general, and responsible care of the public health, this plan appears to me to deserve the serious consideration of the Government.

Is there any other observation you desire to make?——I would express my conviction, derived from much observation and some experience, that the most general and distressing of the evils of which we have been speaking are capable of being gradually removed, and of being almost wholly prevented in future; and that this is a consideration which should encourage and animate the labours of the Commission. No Government can prevent the existence of poverty; no benevolence can reach the evils of extreme poverty under the circumstances which at present universally accompany it; but there is ground of hope and encouragement in the thought that the most painful and debasing of those circumstances are adventitious, and form no necessary and inevitable part of the condition of that large class of every community which must earn their daily bread by their manual labour. Those adventitious circumstances constitute the hardest part of the lot of the poor, and these, as I have just said, are capable of being prevented to a very large extent. The labours of a single individual, I mean those of the illustrious Howard, have at length succeeded in removing exactly similar evils, though somewhat more concentrated and intense, from our prisons; they are at least equally capable of being removed from the dwelling-houses and work-places of the people. Here there is a field of beneficent labour which falls legitimately within the scope of the legislator, and which is equally within that of the philanthropist, affording a common ground, beyond the arena of party strife, in the culture of which all parties may unite with the absolute certainty that they cannot thus labour without producing some good result, and that the good produced, whatever may be its amount, must be unmixed good. I will only further express my hope and belief that the earnest and anxious labour which has been already devoted to this subject, both by individuals and by the Legislature, and which still continues to be devoted to it, will not be made in vain.

NATHANIEL BAGSHAW WARD, Esq., Surgeon, examined. N. B. Ward, Esq.

Have you directed your attention to subjects connected with the health of the humbler classes in crowded communities?——I have.

To what points have you particularly directed your attention? ——The influence of light and of air, freed from deleterious particles.

What observations have you to make upon those points?—— During a practice of 30 years in a densely populated neighbourhood, my attention has been repeatedly drawn to the influence of light, not only as a most efficient means of preventing disease, but likewise as tending materially to render disease milder when it occurs, and more amenable to medical and other treatment. Dupuytren (I think) relates the case of a lady whose maladies had baffled the skill of several eminent practitioners. This lady resided in a dark room (into which the sun never shone), in one of the narrow streets of Paris. After a careful examination, Dupuytren was led to refer her complaints to the absence of light, and recommended her removal to a more cheerful situation. This change was followed by the most beneficial results; all her complaints vanished. Sir James Wylie has given a remarkable instance of the influence of light. He states that the cases of disease on the dark side of an extensive barrack at St. Petersburg have been uniformly, for many years, in the proportion of three to one to those on the side exposed to strong light. The experiments of Dr. Edwards are conclusive. He has shown that if tadpoles are nourished with proper food, and exposed to the constantly renewed contact of water (so that their beneficial respiration may be maintained), but are entirely deprived of light, their growth continues, but their metamorphosis into the condition of air-breathing animals is arrested, and they remain in the form of large tadpoles. Dr. Edwards also observes that persons who live in caves and cellars, or in very dark and narrow streets, are apt to produce deformed children; and that men who work in mines are liable to disease and deformity beyond what the simple closeness of the air would be likely to produce.

Does your observation in the densely peopled districts where you have practised confirm those observations?——Most strongly.

Has any recent account of that case of the barracks at St. Petersburg been received?——I believe not.

Do you propose any suggestion with reference to practical measures of improvement?——I would only propose that as much light be admitted into the dwellings both of the rich and the poor as can be possibly admitted, for I am satisfied that, *cæteris paribus*, their health would be improved.

You think that regulations to secure streets being of a sufficient

N. B. Ward, Esq. width, and regulations for the introduction of light and air into the dwellings of people, would be beneficial to their health?——Yes.

Beneficial to their moral condition also, as giving them more cheerful habits?——Most assuredly; the more dark corners you have in the dwellings of the poor, the greater amount of dirt and filth.

Besides your general impression from what you have seen, and the facts you have quoted, do you happen to recollect any cases where you were certain it was the physical influence of the want of light, unconnected with other causes, which had produced the evils?——Yes. It is a very difficult matter for a general practitioner, not attending any large collection of cases, to cite instances; but from noticing hundreds of times the beneficial consequences of the alteration from darkness to light, and the evils resulting from the want of light, I am satisfied that it is a matter of the highest importance.

At what period of life do you consider that the influence of light is of the most importance to the human species?——During childhood, because it directly influences the physical development.

The strength and constitution of the man is very much dependent on his early rearing during childhood?——Certainly.

Whatever stints the growth of a child must operate upon his physical capacity for labour?——Certainly.

Having good light and good air is of still more consequence to districts which are thickly peopled, and where there are a great number of children than where there are not so many children?——Decidedly.

The districts in the east of London are those most thickly peopled?——Yes.

When persons are going to be married, are you in the habit of giving your advice as to residence?——My advice to young people who are about to marry, and can afford only one or two rooms, is to choose the largest room they can find, and in which they can obtain the greatest quantity of solar light; the amount of disease in light rooms, as compared with that in dark rooms, being infinitely less.

In those populous districts are the alleys and courts in which the poorer classes reside open and well ventilated, or are they at present close, ill ventilated, and unclean?——Many of them are very close and very badly ventilated, and very dirty indeed; for instance, Rosemary-lane and its alleys and courts are as bad as any.

And in which you have great difficulty to prevent running over the children?——Yes, and in running over the pigs, who live with the children.

Have you observed any cases in which recovery from illness and efficiency in remedial measures was effected by the difference between a light and dark room?——If I were on my oath, and I were asked that question, I should say, most certainly; the difficulty is to give an answer that shall be satisfatory to persons not medical. I cannot say I have had three patients in light rooms and three in dark ones (the other conditions being precisely the same), and state the effect; but I am as certain of the influence of light in preventing the fatal termination of disease in many cases as I am that I am sitting here. N. B. Ward, Esq.

On the same principle you would consider exposure to the light of the sun of great importance wherever it could be obtained?——There can be no doubt of that, for the rays of the sun are not only important for the amount of light, but likewise for the accompanying heat, which effects a better ventilation.

It is then a natural power producing ventilation and sustaining it?——Yes.

When you speak of light, you speak of solar light?——Yes; but if solar light cannot be obtained, a large quantity of diffused light is useful.

Is there a great deal of sickness in those districts in which the poorer classes reside, and in which the points above referred to are much neglected?——I believe there is; but this I know only from conversations with the gentlemen attending the parish poor; I do not attend them.

Is there much fever in those districts?——I know there is.

Such illness would have the effect of preventing such persons following their ordinary occupations?——Decidedly.

It would therefore occasion a deduction from their earnings?——Yes.

Would it not occasion also the incurring an expense to procure the assistance of those who have to attend them in illness?——Yes.

Also the money which the benevolent subscribe to fever hospitals and other institutions?——Yes; and those who do not subscribe to fever hospitals are applied to privately.

Do you think that measures to secure the cleansing of courts and alleys would have the effect of saving a considerable amount to those connected with public institutions, and to private individuals?——There cannot be a doubt of it.

Is there any other point on which you can afford information to the Commissioners?——There is one point to which I will venture to direct the attention of the Commissioners: among the diseases to which the children of the poor are subject, there is not perhaps any so destructive in its immediate and remote results as measles, and none in which more good can be effected by prævenient remedial means; often insidious and mistaken in its onset, and not exhibiting any very active symptoms during the eruptive stage, the parents are lulled into fancied security. This stage, however, is too frequently succeeded by more or less active inflammation of the lungs, which destroys the patient. Months, and sometimes years, will

N. B. Ward, Esq. elapse before this effect is produced, during which time the patient drags on a miserable and helpless existence. It has been my invariable plan for years past, on the occurrence of measles in one of a large family, to communicate the disease to the rest of the members when they have been healthy, and the weather favourable.

Do you mean by a species of inoculation?——By placing them in the same room or in the same bed. Now, I would strongly recommend the adoption of this plan with respect to the poor, and I feel convinced that the results would be as favourable as those which have followed inoculation and vaccination. The mortality from measles, I believe, is somewhere about 10,000, and the mortality from consumption is about 50,000. Now of these fifty thousand, I can certainly say that a great number owe their consumptions to preceding measles; many cases have occurred in my own practice where consumption has destroyed the child after an interval of one, two, or three, or more years. I conceive my plan would be one of exceedingly easy application, and I am quite certain that 12 or 14 days' attention to children would frequently save them years of suffering, and eventually their lives.

In the course of your investigations on the influence of the temperature of air and light on the health and growth of animals and plants, you were led to the discovery of a mode of rearing plants in large towns, and conveying them to and from distant places, by what are commonly called Ward's Cases?——Yes.

Are you of opinion that if plants were grown in that manner in the dwellings of the poor, they would have any beneficial effect? ——I think it would be laying the axe to the root of the tree; that you would do more good to the poor by the adoption of some such plan than can be conceived; that by the introduction of those plants, you would induce the poor to get out into the woods round London, instead of going to the public houses; and that it would be an occupation of the most interesting nature to the women and the children.

What would be the expense of one of the cases referred to?—— The expense would be trifling; glazed and puttied frames can be obtained at a shilling the square foot, which might be put in their windows and little yards, and they would repay the expense of the case within a twelvemonth by the growth of salad or flowers. These cases are becoming more common, and furnish the most delightful blinds which can be imagined.

Have you reason to think that they have a direct influence in diminishing the quantity of carbon or deleterious ingredient?—— There cannot be a doubt of it; the concurrent testimony of all naturalists proves that the vegetable respiration counterbalances animal respiration by purifying the air which animals vitiate.

In many cases where ordinary drainage could not be effected, you would secure a similar effect by the introduction of vegetation? ——Yes.

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Do you think that if plants could be introduced, they would have that effect?—I think the effect would be in proportion to the amount of vegetation; the most putrid ditches and ponds will be purified by plants growing in them, and the water is preserved in a state fit for animals to drink.

Do you think there are any plants which can be kept in a room where persons are living which are injurious?—There are some plants whose odours may be injurious to certain individuals, but, generally speaking, plants have no other effect than that of purifying the air.

Are there any particular plants, in the dense, and not very good atmosphere of London, which are more easily kept in those small cases, which would be suitable for the poor?——By means of these cases you can command, in the most smoky parts of London, a most luxurious vegetation, and in proportion to the solar light and heat you may get flowering plants, and plants with greater colour, and so on; but there is light enough in the most dirty parts of London to grow plants of the most delicate kind; as, for instance, the Irish fern, the Trichomanes speciosum. This is a plant which has hitherto baffled all attempts at cultivation, and which, if placed in a glazed case, will now grow in any blacksmith's shop in London.

Your cases are not absolutely air-tight?——The law regulating the diffusion of gases would render such a state of things impossible. The cases are only made sufficiently close to retain the moisture, and exclude all deleterious particles.

NEIL ARNOTT, Esq., M.D., examined.

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SINCE your first investigations into the sanatory condition of the population, have any facts occurred to modify the views you then expressed in your reports regarding the influence of impurities of the air in and about dwellings as a cause of disease?——Much has occurred to confirm them. Dr. Allison, about that time, strongly expressed an opinion that we had attributed too much to the emanations of decomposing animal and vegetable substances, and too little to distress, as exciting causes of fever. At the time when we made our inquiries there was in the Spitalfields district an unusually severe epidemic, although there was comparatively full employment. Subsequently the employment diminished, to the extent of half the looms being out of work; and the medical officer of that district, who in times of full employment had as many as 800 fever cases to attend to in one year, then found the number fall to 250 cases. He states that—

"The greatest number of fever cases we have is of persons who fall ill during the time they are in employment. I think they are more attacked when in work, when the windows are closed, and there is no ventilation.

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Many of them are obliged to work with closed windows, to keep out the moist air and prevent the dust blowing upon their work. When they are out of work they are more out of doors looking after work—more in the open air; and that very exercise may be the means of keeping them in health. This observation applies to the weavers. I find that they have generally less fever when they are out of work. The reverse, I think, holds as respects out-door labourers, such as those who work at the Docks. When they are out of work, they stand about waiting in the cold, and when cold, they generally take cheap gin, and no food; they catch cold, and on going to their close, filthy habitations, their cold is apt to generate fever."

Have similar results been observed elsewhere?——At Glasgow similar observations have been made. Dr. Davidson, the senior physician to the Glasgow Infirmary, in his Prize Essay, gives an account of the physical condition of the 429 persons admitted to the hospital under the following divisions:—

"1. Moderate; a person having an ordinary quantity of muscle and cellular substance; males 116; females 93; total 209.

"2. Full or plethoric; having an extra quantity of adipose texture, or of blood; males 28; females 73; total 101.

"3. Muscular; males 44.

"4. Spare; males 24; females 41; total 65.

"5. Emaciated or unhealthy in appearance; males 2; females 8; total 10.

"The whole of these 429 cases were characterized by the typhoid eruption, and will therefore be considered as decided cases of typhus. It appears from this table that there were only 10 cases in an emaciated or unhealthy condition; and almost all of them, as far as could be ascertained, were engaged in their ordinary occupations at the time of their seizure. The spare and unhealthy, when added together, form only about 17 per cent. of the whole number."

Has there been any subsequent experience in the same part of the country?——Yes; in May, 1832, there was an almost entire cessation of work at Paisley, so extensive that extraordinary means were taken, by general subscriptions, and with the aid of the Government, to relieve the distress. At that precise time the medical men having charge of the Fever Hospital were surprised by an extraordinary diminution in the number of cases of fever. There were during that month just one-eighth less than the average during the five preceding years. But the demand for goods and labour subsequently returned, so that the whole population was again employed, and warehouses were cleared of goods that had not been empty for ten years before. In this restored state of the labour-market a new epidemic broke out.

What are the later effects observed?——The district surgeons of Glasgow state, in their Report on the town's hospital of that city, that "in 1841—2 the number of cases received in that hospital was 5296; but the number received in 1843 has been 19,085 cases, or an increase of 13,789 cases; of which 12,967 were cases of a peculiarly distressing epidemic fever, and 736 were cases of typhus fever. The mortality from typhus has been nearly double that of 1842. The cases of disease generally in 1843 has been greater than that for the whole of the four preceding years." The medical attendants stated that "it was the most severe amongst the labouring classes, 'even although the individuals were apparently somewhat robust, *if their habitations were dark, damp, filthy, and unventilated.*'"

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Has there been any subsequent experience in England?——Other confirmatory facts have arisen in the subsequent experience in Manchester. In the year 1840 the total deaths in that town were 1 in 28·36; but though distress increased, they were reduced in 1841 to 1 in 31·59. In the following year, when there was an increase of general distress, they still diminished to a rate of 1 in 33. They diminished in Manchester, which was distressed, in 1842, whilst in Liverpool, a commercial city where the labouring population had suffered little comparatively from distress, the deaths increased to the number of 700 above the average. The following are the registrars' returns of deaths in the two districts during the respective years. The remarkable reduction of the number of deaths from epidemics in Manchester during the year 1841, whilst there was no corresponding reduction in the number of deaths from epidemics in Liverpool, which was most probably subject to similar climatorial influences, will not have escaped the attention of the Commissioners. The returns for the two last years have not yet distinguished the deaths from epidemics, but I believe it is known that they have increased again with the general mortality.

—		1838	1839	1840	1841	1842	1843
Manchester	Deaths from all causes	6706	6774	6489	5821	6139	6263
	Epidemics. . . .	1707	2006	1848	1163	..	..
Liverpool	Deaths from all causes	6627	7435	8470	7556	7400	7458
	Epidemics. . . .	1368	1844	2737	1677	..	..

Are you enabled to give any further information received on this important topic?——The condition of the population of the American towns has been referred to as being a population amongst whom distress can be scarcely said to exist in such forms as in the British towns. The condition of the American town population has been referred to in Parliament as an instance of what may be done, independently of any sanatory regulations. Now it has recently been shown that in these towns the sanatory condition of a large proportion of the population of many districts is even lower than in England. From a report by Dr. Griscom, the inspector of funerals in New York, it appears that the average age of death there does not exceed 20 years, judging from the returns of one year, which does not seem to be an extraordinary year. It appears—

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"That upwards of 33,000 of the population of that city live in cellars, courts, and alleys, of which 6618 are dwellers in cellars. 'Many,' he states 'of those back places are so constructed as to cut off all circulation of air, the line of houses being across the entrance, forming a *cul de sac*, while those in which the line is parallel with, and at one side of the entrance, are rather more favourably situated, but still excluded from any general visitation of air in currents. As to the influence of these localities upon the health and lives of the inmates, there is, and can be, no dispute; but few are aware of the dreadful extent of the disease and suffering to be found in them. In the damp, dark, and chilly cellars, fevers, rheumatism, contagious and inflammatory disorders, affections of the lungs, skin, and eyes, and numerous others, are rife, and too often successfully combat the skill of the physician and the benevolence of strangers. I speak now of the influence of the locality merely. The degraded habits of life, the filth, the degenerate morals, the confined and crowded apartments, and insufficient food of those who live in more elevated rooms, comparatively beyond the reach of the exhalations of the soil, engender a different train of diseases, sufficiently distressing to contemplate, but the addition to all these causes of the foul influences of the incessant moisture and more confined air of under-ground rooms, is productive of evils which humanity cannot regard without shuddering.' He gives instances where the cellar population had been ravaged by fever whilst the population occupying the upper apartments of the same houses were untouched. In respect to the condition of these places, he cites the testimony of a physician, who states that, 'frequently in searching for a patient living in some cellar, my attention has been attracted to the place by a peculiar and nauseous effluvium issuing from the door, indicative of the nature and condition of the inmates.'" By recent information obtained from Philadelphia, it appears "that on the average of 12 years the mean age of death has not exceeded 20 years and 7 months. Half of those born there appear to die before the fifth year, and no less than 27 per cent. of the remainder die under 50 years of age, and the average age of death, of all who die there above 20 years of age, appears to be below 46 years, whilst in Bethnal-green, one of the worst districts in London, it is nearly 49 years; and the average in London appears to be 53 years."

Dr. Governeur Emerson, in a paper on the Medical Statistics of Philadelphia, states that some publications there adverted to "have represented the mortality of Philadelphia as exceeding that of the principal cities in the United States, whereas it has been shown to present as low if not a lower rate than any one of them; we mean under ordinary circumstances, and in the absence of those epidemic visitations to which all places are subject." Dr. Emerson, in his own paper, states that he had shown in a former paper,—

"That the influence of the sickly air was expended upon that comparatively limited portion of the population living in the environs and outskirts of the town. With these, fever in some of its forms was almost universal, whilst in the more dense and well-paved parts the air seemed unusually healthy, and where remittents and intermittents were met with, they could almost invariably be traced to exposure to night air in the country or suburbs. Never was a stronger demonstration afforded of the resistance made by cities to the influence of country malaria than our late experience has furnished. Great as was the amount of sickness, it was confined almost entirely to the comparatively small proportion of population inhabiting the unpaved or ill-paved environs. Our observations on

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this and other occasions have led us to ascribe this exemption for the most part to the pavements, which, by effecting a perfect draining, prevent exhalation, at the same time that it admits of the total removal of vegetable and animal matters, the sources of foul and unhealthy emanations. The chief motive for paving the streets and side walls is usually convenience, but it has always appeared to us, that by far the most important object achieved by it was the preservation of health. Whilst upon the subject of public hygiene, we cannot restrain ourselves from noticing another consideration connected with it, namely, ventilation, or a proper supply of pure, unrespired air. By far the greatest proportion of the annual sickness and mortality of ordinary seasons is furnished by the narrow and confined alleys and courts existing in various parts of the town. The low terms upon which the small houses and rooms in such places can be obtained, causes them to be literally crowded with a class of population for the most part negligent of cleanliness, and it can occasion no surprise that there should be a great disparity between the proportions of sickness and mortality among these, compared with that which takes place in the portion living in larger dwellings, having a freer circulation of air. The difference just mentioned, though sufficiently obvious in adults, is most lamentably conspicuous among children. Notwithstanding the great numbers of these which die annually of cholera, we feel ourselves warranted in asserting that deaths from this disease are rare in houses with large and well-aired apartments. To one who in the capacity of physician to a dispensary or other charity, has been engaged in the arduous duties of attending the poor in their uncomfortable abodes, evidences of our assertions must be abundantly familiar. The numerous instances wherein the mercenary calculations of individuals have tempted them to put up nests of contracted tenements in courts or alleys, admitting but little air, and yet subjected to the full influence of heat, have often induced us to wish that there could be some public regulation by which the evil might be checked. Mankind have inhabited cities long enough to know from severe experience that there are certain limits to the denseness of population, which, when passed, always lead to disease and mortality. As we think everything tending to the preservation of public health must be a fit subject for legislation, we do not see why a law should not be procured by which the undue crowding of population might be prevented, and the number and size of dwellings adjusted to superficial limits. There are at present municipal regulations intended as a protection against conflagration, by designating the materials of which houses shall be constructed: and if such precautions be deemed so important when property is the consideration, of how much more consequence would be those for the preservation of health and life! It is common to attribute the greater mortality known to take place under ordinary circumstances in large towns, among the poorer classes, chiefly to meagre or unwholesome food, and immoderate indulgence in strong liquors. But in this country, where, for a part of the year we are subjected to a degree of heat little, if at all, below that of the tropics, the influence of both these causes in the production of disease, is, in our opinion, insignificant, when compared to that of breathing air that has been previously respired, and which, moreover, is commonly charged with animal and vegetable effluvia. That the same diet and habits of life in the country or small towns would not be attended with a degree of sickness and mortality corresponding to that found in the crowded portions of large towns, is, we think, beyond a doubt."

Does the remark upon the facts cited by the medical officer of Spitalfields appear to you just, when he says that distress in itself cannot be a cause of good health, but that some of the

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consequences, such as absence from the crowded and ill-ventilated work-rooms, or from ill-ventilated and ill-drained houses, and the inability to gratify hurtful and costly propensities, may, for a time, be more influential in preventing disease than the scanty supply of food and clothing is in inducing it?——I believe this explanation to be applicable in many cases.

Do you continue to hold, in relation to the various subjects touched upon, the opinions which you have previously expressed?——I do very nearly; and I might recapitulate them as follows:—Our inquiries gave us the conviction that the immediate and chief cause of many of the diseases which impair the bodily and mental health of the people, and bring a considerable proportion prematurely to the grave, is the poison of *atmospheric impurity* arising from the accumulation in and around their dwellings of the decomposing remnants of the substances used for food and in their arts, and of the impurities given out from their own bodies. The means of removing these sources of injury are—1st, the labour of scavengers for bulky solid matters; 2ndly, the use of sewers or drains, with a sufficient supply of water for liquids and comminuted solids which running water can carry; and 3rdly, modes of ventilation for ærial matters. Now, in our best towns and improved localities, prodigious faults are still committed in respect to all the particulars mentioned. 1st. There is in many places defective work of scavengers, as became notorious when the cholera prevailed. 2ndly. Drainage is yet generally imperfect, and that in various ways. (*a*) In some places there are only open or surface drains, allowing exhalations freely to rise into the atmosphere, and these often are stagnant, and by that more noisome—as still seen in some parts of the suburbs of London. (*b*) Even covered drains are often made with insufficient fall or declivity, and so become only extensive cesspools, contaminating the soil around them and the atmosphere above—as may be discovered at any time in some of the streets of London, where the drains have to be opened at intervals for the removal by scavengers of a solid deposit, accumulating to obstruction. (*c*) Even with good street drains, there may be defect in the house drains, or in their connection with the others; or in the sinks, water-closets, &c.; as proved by noted cases where fevers have infested particular houses for long periods, until the drains and adjuncts were put into good order. From want of proper supervision, one or other of these defects is very common, rendering the heavy expense of the present system nearly fruitless to many parties. (*d*) Then the supply of water requisite to render drains effective is often altogether wanting, or is obtainable only at an expense which many of the poorer inhabitants cannot afford. Yet we know that with good arrangements, such as have indeed already been made by the municipal authorities of certain places, abundant supplies of excellent water for every useful purpose may

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be had at less expense than in most places it costs in money or labour to the poorer classes to obtain what is absolutely necessary for their mere drinking and cooking. 3rdly. The subject of ventilation has, as yet, been so little attended to, and is so little popularly understood, that even our Houses of Parliament, in which the intelligent and wealthy of the land assemble, were until lately seriously hurtful to those who had to be much in them from the great impurity of the air occasioned by the crowd. The same fault, unsuspected, exists to a considerable degree in many of our ordinary domestic arrangements; and in workshops and the dwellings of the labouring classes it is one of the great scourges of the people. In the use of fuel also, by which so much impurity is produced in the forms of smoke and deleterious gases, the people generally have yet much to learn and much to amend. Now I fear that without legislative interference the evils here referred to would long remain with little mitigation. But I believe that, as in a regiment or a ship placed in trying circumstances, the exertion of competent skill and authority has often made the difference between a body of men broken down by disease and loosened discipline, and British troops or a war vessel remaining in full perfection equal to any high task which the public good might assign—so may suitable laws and a fit administration of them in regard to the health of the whole community go far to annihilate influences which now weaken constitutions, generate epidemics, and doom many of the labouring classes to hospitals and workhouses, with the consequences to all around them of lowering the morality and the general tone of mind. Thus would a labouring population, among whom there is now much depression, suffering, and disease, be changed into a more healthy, hardy, and happy people, likely to prosper in their undertakings, and to exhibit civilization in improving forms.

Do you consider the means of ventilation to be now so clearly ascertained that they may be prescribed in the same way as the means of drainage have been by legislative enactment for adoption in houses built for the occupation of the poorer classes? ——I fear, not yet. The means are known; but not being of the same simple nature and uniformity for all cases as the means of draining, and requiring to be adapted to constantly varying circumstances, the right use of them must depend on the intelligence and will of the people concerned.

Do you think the object may be obtained by means of suggestion?——Although much must be left to the inhabitants of the houses, I think it would still be desirable to command thus far, that there should be near the upper part of every room an opening, to be used on proper occasions, to allow the hot breath and other impure air, which rises to the ceiling, to escape there. It is impossible to ventilate aright a room containing a number of

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persons, except through an opening near the top of it, and the great defect of all our arrangements now is the want of such an opening.

Do you think, with reference to the lower class of lodging-houses, that, supposing they should be put under public inspection, for the sake of the health of the inhabitants, some regulation as to the ventilation of those houses might be enforced?——I think it might. When I visited Glasgow with Mr. Chadwick there was described to us one vast lodging-house, in connexion with a manufactory there, in which formerly fever constantly prevailed, but where, by making an opening from the top of each room, through a channel of communication to an air-pump, common to all the channels, the disease had disappeared altogether. The supply of pure air obtained by that mode of ventilation was sufficient to dilute the cause of the disease, so that it became powerless.

Do not you think that, though it might be difficult to enforce, by legislative enactment, any ventilation in the dwellings of private persons, still, by means of suggestion, a cheap mode of ventilation might be gradually introduced in rooms where a number of persons were congregated together?——I believe it would, in many cases, be sufficient to make the parties interested aware of the vast importance of ventilation to the inmates, and of the ease with which it may be had. In work-rooms, such as those where tailors sit, or milliners, or where work-people of various kinds are employed, any new expense for the purpose of ventilation would always be a consideration, but with improved means, likely soon to be introduced, this expense would be trifling.

Do you not think that the same observation applies itself with increased force to the necessity of ventilation in schools, where a number of the children of the poorer classes are congregated for a number of hours?——I think legislative regulations should certainly be made with respect to them.

At all events, would you not consider that in schools, which are supported by contributions from the public, the public would have a right to require that some such improvement should take place?——I believe, as before stated, that the neglect is, in most instances, owing altogether to ignorance of the subject on the part of the managers. We had a remarkable instance a year or two ago, which serves to show the degree of knowledge that exists among the public at present on this subject. In the Zoological Garden in the Regent's Park a new house was built to receive the monkeys, and no expense was spared which, in the opinion of those intrusted with the management, could ensure to these natives of a warmer climate all attainable comfort and safety. Unhappily, however, it was believed that the objects would be best secured by making the new room nearly what an English gentleman's drawing-room is. For warming it two ordinary

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drawing-room grates were put in, as close to the floor as possible, and with low chimney openings, that the heated air in the room should not escape by the chimneys while the windows and other openings in the walls above were made as close as possible. Some additional warm air was admitted through openings in the floor from around hot water-pipes placed beneath it. For ventilation in cold weather, openings were made in the skirting of the room close to the floor, with the erroneous idea that the carbonic acid produced in the respiration of the animals, because heavier than the other air in the room, would separate from this, and escape below. When all this was done, about sixty healthy monkeys, many of which had already borne several winters in England, were put into the room. A month afterwards more than fifty of these were dead, and the few remaining ones were dying. This room, open only below, was as truly an extinguisher to the living monkeys as an inverted coffee-cup, held over and around the flame of a candle, is an extinguisher to the candle. Not only the warmth from the fires, and the warm air that was allowed to enter by the openings in the floor, but the hot breath, and all the impure exhalations from the bodies of the monkeys, ascended, first, to the upper part of the room, to be completely incorporated with the atmosphere there, and by no possibility could escape, except as a part of that impure atmosphere, gradually passing away by the chimneys and the openings in the skirting. Therefore, from the time the monkeys went into the room until they died, they could not have had a single breath of fresh air. It was necessary only to open, in the winter, part of the ventilating apertures near the ceiling, which had been prepared for the summer, and the room became at once salubrious.

You are aware that in the greatest portion of the rooms of the poorer classes the windows open only in the lower part, and that the upper part does not open at all,—do not you think it might be advisable to compel the sashes to be made so as to open both below and above?——Yes. The day after I saw the monkey-house just mentioned, I was sent for to visit a young gentleman at a respectable school in the neighbourhood of London, where there were about forty boys. The boy I went to see was thought to be falling into consumption, and I learned that others of the boys also were ill. On examination I found the cause to be only a less degree of the error which had destroyed the monkeys. The two cases struck me forcibly, as illustrations of the little knowledge on the important subject of the essentials to health possessed by persons otherwise highly accomplished.

Then the school was neglected in the same way?——Yes; a new school-room had been built at the back of the dwelling-house, in which room the forty boys spent much of their time, and there was no opening by which their breath could escape from the room,

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except through the low fire-place. There was, indeed, a skylight above with sashes, which might be opened; but the schoolmaster told me that he took care never to open these when the boys were present, because, having done it once, a boy got severe inflammation of the lungs, in consequence of the cold air rushing in upon him. This gentleman had gone to great expense to secure, as he thought, the health and comfort of his scholars; but, from want of knowledge on the subject, had missed his aim, just as had happened in the case of the monkey-house.

Was not that monkey-house constructed, as it was believed, with the aid of the best available knowledge on the subject?——It was; persons were employed whose special profession it was to manage such matters.

Are you not aware that there are Encyclopædias of Architecture and Building in which the topic of warming and ventilation does not occur?——I know that the subject has been very little understood by those whose business it was to study it fully.

Is it not your impression, from the universal ignorance you have met with on these subjects, that some measure is desirable, independently of mere legislative enactments, to introduce a more general knowledge among all classes of society upon the subject?——I believe that, if a good book were published on the subject, it would be of great service. Public attention is now awakened to it much more than formerly, and the book might be made very simple.

Do not you think that it would be desirable, in order to ensure the general adoption of these principles, to comprehend them in the course of instruction in primary schools?——Yes; it really is a most important part of every man's education to learn a little of physiology in its applications to the preservation of his health; and I have no doubt that in a few years this kind of knowledge will be much more common.

You expect more from the general spread of knowledge amongst the community than from any legislative measure?——Yes; but I think legislative means should not be neglected. I think there should be no room without an opening in or near the ceiling, to be used when needed. All rooms should have the upper window-sashes made to be drawn down; and, in certain cases, an opening might exist into the chimney, or through the ceiling. Knowledge of the subject, however, is required for the right use of any of these means, as with an open fire the first and last mentioned might become inlets of cold air, passing towards the fire, instead of being outlets for the impure air leaving the room. Then, unless the inmates of a room were aware of the importance of ventilation, they would rarely use any means which caused either trouble or expense. More fuel would be required to warm a room when well ventilated than when not.

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With respect to ventilation by opening the lower sash of the window, do not you think that such a method of ventilation is extremely objectionable on account of the cold air which rushes in, which may be apt to produce chills and rheumatism to the inhabitants, without allowing the impure air to get out?——I think it is. If the window be opened from the top only, some warm air may occasionally escape by it; but if there be an open chimney in the room, unless the bottom sash also of the window be opened considerably, the top will be converted into an inlet.

But the ventilation that can be obtained through open windows is not the kind that is desirable?——No.

It is too sudden and too rapid?——Yes.

Do you also entertain the opinion that provision for some systematic mode of heating is at the root of all improvement in ventilation?——I do.

You have introduced a new stove for the purpose of warming houses?——I have; of which I published an account some time ago; as also of new means of ventilation; by one of which the warm impure air that goes out is made to give up its warmth to the pure air that is coming in. In that account I explained fully the general principles of the methods, and illustrated them by particular examples; but the manufacturers, generally, wishing to have credit from modifications of their own, did not follow my directions, and fell into serious errors. I am now preparing a new edition of my work, in which very detailed directions and observations on what has happened will, I hope, guard the public against the recurrence of the faults. I have no doubt that simple and cheap means, both of ventilating and warming, may soon become general.

You are probably aware that many stoves are sold under your name as Arnott's stoves which are not constructed in any way upon your principle, having no means of regulating the combustion of fuel, and which are not accompanied by any means of ventilation?——Of the vast number of the new stoves made and sold over the country, only a small proportion were made and used properly; and this led many persons to think the objects sought much more difficult to be attained than they really are.

Have you any plan to suggest for securing the better ventilation of rooms?——I have recently had a cheap apparatus constructed, according to the principles laid down in my book, for the purpose of ventilation generally, and I shall soon be able to describe it and its applications in detail. If the members of this Commission continue sitting for some time longer, I may have the account prepared before they close their labours.

Is it not the case that you have met with extreme difficulties in the general application of your stove, not only from ignorance in the manufacturers, but also from the total inability of persons to

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regulate the management of the air in their own apartments in which it was placed?——I found that those using it, as well as those who made it, had to be instructed anew before they could do their part aright. I have had a stove in my own library now for six years, which the housemaid manages as easily as if it were a clock. It is lighted once at the beginning of the season, and then burns night and day until the end. The coal is put on once a-day, and the fire is raked or stirred twice a-day, at stated times, and no further watching is required. The ashes are taken away once a-week. The consumption of fuel for the twenty-four hours is but a small part of what would be required for an open fire in twelve hours. The heat of the surface of the stove is considerably less than that of a tea-urn; and by reason of the thermometric governor, or other heat-regulator, it never varies from the degree at which I may choose to set it.

Is it common coal that you use?——The Welsh coal, called anthracite. Common coke is also suitable fuel.

Would your stove do for the humbler classes, on account of its being sometimes dangerous to burn common coal in it?——It is no more dangerous to burn common coal, in the form which I directed for common coal, than to burn it in an ordinary grate. I described two forms of the stove: one in which fuel containing inflammable gases might be burnt; the other for non-bituminous fuel; and the error was to use, in many cases, that fitted for non-bituminous fuel in lieu of the other. The modification for bituminous fuel may be described as being a common Dutch stove, made with well-fitting doors and joints, having a heat-governor to maintain uniformity of combustion, and an external covering or case around it, which becomes of only moderate heat, and prevents the air of the room from touching the over-heated surface of the inner stove or fire-box itself. There can, therefore, be no more danger from it than from the common Dutch stove.

The ordinary stoves sold under your name, in which common coal cannot be burnt, have not been made according to your principle?——Many of them not.

Have you ever had any of your stoves made altogether of fire-brick without iron?——Yes, I had one put up in my pantry three years ago, made all of brick except the doors and top; it cost about 30*s*., and has been in steady action during the winters ever since. I think where a stove is to remain always alight it might conveniently be made of two or three pieces of earthenware. In Germany good and handsome stoves are made of one piece, or of two or three pieces, like the parts of a bee-hive placed one on another.

You are aware that fire-brick is a much better reservoir of heat than iron?——All that is wanted in such closed stoves as I am speaking of is some material that will exclude the air; it is not

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important that it should be a good conductor. The heat is sure to come through as fast as is desirable.

Would you refer to the evidence you gave upon the state of the poor before the Committee on the Health of Towns, and to your observations in the Fourth Report of the Poor Law Commissioners, and in the other Report that you made respecting Edinburgh, as affording an explanation of your opinions of the present state of things, and of the necessary improvements?——I would.

With respect to a cheap apparatus for ventilation, would you rather wish to suspend your answer as to that for the present?——I may state, generally, that I propose the use of a very simple air-pump or bellows, of suitable size, and free from an error of construction which, in those made hitherto, has rendered the labour of working from fifty to one hundred times greater than it needed to be. This error has been the reason why mechanical ventilation has not been introduced in innumerable situations where it was exceedingly wanted. The philanthropic Dr. Stephen Hales, D.D., was, I believe, the first who had a bellows constructed for the purpose of ventilation. He had remarked that in the human frame, as in the frame of warm-blooded animals generally, a considerable part of the bulk was occupied with apparatus intended solely for the purpose of ventilating the blood, or of exposing the blood to the action of pure atmospheric air. This part is the chest, or breathing apparatus, which has to work incessantly from the moment when the individual enters the world until the moment when he leaves it. To shut up, therefore, a thousand men in a ship or a house, nearly closed against admission of fresh air, was, he said, to render useless the breathing apparatus so admirably provided by nature. He concluded, therefore, that a ship or a house, or any other place in which many persons were to assemble, should as unfailingly have its provision for ventilation as a man has his chest and lungs. He proposed, for the purpose, a large bellows. Of the first which he caused to be made, every stroke displaced about fifty cubic feet of air. It was not made with sides of leather like a smith's bellows, or a common organ bellows, but all of wood, with a moveable wooden flap or shelf within it turning on hinges at one end, which flap divided the enclosed space into two parts; and, when elevated, forced air out from the upper part; when depressed, forced it out from below. But although Dr. Hales was aware to a certain extent of how much more easily, in a common bellows, the air is drawn in and expelled through the large valve or flap below than through the smaller opening of the nozzle, he committed the fault of making the valves of his apparatus much too small, and the air, both in entering and passing out, was *wire-drawn*—that is to say, it was drawn in through a narrow opening, and forced out through a narrow opening. He reports that he first tried with the openings a hundredth part of

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the size of the midriff or piston of the pump, but finding that the air then was forced through with extreme difficulty, he enlarged the openings to a forty-fourth part, and he deemed that sufficient. The truth was, however, that by driving the air out through an aperture forty-four times less than the piston which he was moving, he increased the labour of moving the piston just forty-four times beyond what would have been required to move it if the opening had been as large as the piston; and, farther, having drawn the air in at a similar narrow opening, he still doubled the expense. Thus, if one man had been able to pump air for a ship's company by a bellows or pump with valves of a proper size, it would have required a great number to do the work by such faulty apparatus. In fact, two men at a time were required to work the bellows, who had to be replaced by two others every quarter of an hour. So little is this subject yet understood in quarters where it should be studied, that so late as last year an air-pump on Dr. Hale's plan, with all its faults, was put into a ship fitted out in one of the Royal Dock-yards. A similar error to that above described has been committed unsuspectedly in other apparatus. A few years ago many of the steam-engines in Cornwall were doing only half their work, and some of them much less than half, because they were blowing their steam towards the piston through narrow openings instead of through large. In the ventilation effected by fan-wheels moving quickly, the waste of force is prodigious, being, at the least, in proportion to the greater velocity given to the air, than what air should have when it reaches the persons who are to breathe it. A pumping apparatus, to be worked by one man, might be easily made to do the business which a force of from forty to eighty men would accomplish with common defective machinery.

What is the principle upon which you do it?——I allow the air to pass through wide openings, so that very gentle force or pressure suffices, and which may be exerted with a comparatively light piston, and with valves of cloth merely in the form of curtains resting against wire-net supports, instead of heavy flaps of wood or metal. Such construction removes the whole objection arising from expenditure of power. I have already described the thing generally in my little publication upon heating and ventilating; and I shall soon give the details of the construction and use in my new edition. I may illustrate the subject of this pump by supposing a passage or lobby to exist 10 feet square and 50 feet long through a house. This passage would hold 5000 cubic feet of air. If a little go-cart were placed in it with a sail hoisted on it to fill the passage nearly as a piston fills a barrel, the passage being open at the two ends, and there being no wind, a child would, in pushing his go-cart from the one end to the other, discharge 5000 cubic feet at one end of the passage, and would draw in as much at the other, without knowing that he was doing anything but moving his cart forward in an empty space, and if the passage opened directly into a large apartment by a door as wide as itself, the action of the go-cart would evidently change at each turn 5000 cubic feet of air in that apartment. If, however, instead of having the end of the passage quite open, a hole were left in it of only one foot in diameter, then evidently the air would have to pass out by that hole 100 times as fast as the sail of the go-cart was moving, and it would then require 100 times the force to carry the sail forward at the same rate to expel the air. And if, further, the air had to enter the passage by an equally narrow opening, the force required to move the go-cart would again be doubled. With large openings at both ends very slight force suffices, because then the whole work to be done is not to lift any weight, but merely to overcome slowly the inertia of a certain bulk of light aerial fluid, nearly as is done by a person who pushes an expanded umbrella before him in a calm day.

You refer to cases where mechanical power must be applied?——Yes.

Not to the ordinary spontaneous discharge from the top of apartments?——No; but I believe there are modes of applying the power that would be here required so cheap that there would be no objection to the cost.

Do you mean such as by sending air into houses by air companies?——I mean that it would be possible to move a mechanical ventilating apparatus at almost as little cost as to move a large clock by winding it up, and so, for instance, to supply the pure air required for a crowded evening party.

But where mechanical power is not applied, in ordinary cases you would get sufficient power from nature if it be not counteracted?——Yes; the natural motions which occur among masses of air of different temperatures, and with different specific gravity, aided by wind, when there happened to be any, would be of power perfectly sufficient in many cases. As, however, external and internal temperature are often nearly the same, and often there is little wind, there should be, wherever crowds assemble, the power of calling in mechanical aid of certain efficacy. The simplest force in many cases might be the labour of a man, as in the case of turning a cutler's wheel, or other such work. It would be easy also to make a winding-up apparatus. It would be easy to make a water company supply the power, by filling a cistern at the top of the houses and letting the water work while passing into a cistern below; and there are other simple means.

Do you consider that such mechanical means would be more effectual than a lamp or a little coke heating a chimney?——Yes, but any one of such means could be made to answer, and the choice would be decided by the circumstances of the case.

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In all public buildings, such as the courts of law, and so on, would you think it right that the Legislature should enforce something of this kind for the health of the numerous persons whose business compels their attendance there?——Yes; and in regard to churches, many illnesses and deaths proceed from faults of ventilation and warming; from the rush of cold air in one place upon those who sit near the door or windows, and the want of fresh air in other places.

Do not you find that there is considerable difficulty in getting persons suffering from deficient ventilation to take the trouble that is necessary to understand the subject?——Yes: they may tell their medical man, when he makes any representation to them on the subject, "that ventilation is a hobby of his, and that hitherto people have got on very well without attending to it." If they hear of such occurrences as that in the first American war of 2000 British seamen dying in one fleet from fever and want of ventilation, it is not their case, and they cannot understand it. Thus also, a few years ago, when in the great charity-school at Norwood, containing 700 children, the greater part of these fell into ill health, and many died, really from imperfect ventilation of the house, it was believed by the public that the children were dying for want of food, and there was consequently a great outcry against the well-meaning man at the head of the establishment for not feeding the children properly. In truth he was feeding them better than the other proprietors of schools of the same class around London, but he shared the common ignorance of the subject of ventilation, and having so great a number of children in his establishment, the ill effects became more evident. The children recovered their health when the faults in respect to ventilation were pointed out and remedied. There were two or three medical men who commenced the outcry, showing that among medical men there were some who had not studied the subject sufficiently.

From what you have seen with respect to the state of the atmosphere in buildings generally, do not you consider that it would be a matter of great importance not only for medical men, but also for architects and engineers, that the subject should be enforced as a branch of education among those professional classes?——I do. I think acquaintance with it almost as important to the utility of a medical man as acquaintance with anatomy.

And to architects and persons who have to do with the construction of houses?——Yes; to architects especially, and surveyors of buildings.

Would it not be important that in the appointment of officers for the superintendence of new works, with reference to the health of the population, they should be required to undergo an examination upon the subject?——Unquestionably.

Would you consider that this effective ventilation, if necessary in

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crowded places generally, is more especially necessary in prisons?——Yes.

Have you studied the ventilation of buildings erected for public charities, and have you found that infirmaries and hospitals are often very badly ventilated?——Very badly indeed.

Would it not be very important to prevent the communication of disease that they should be properly ventilated?——Certainly; it has been found in a public infirmary that when the number of cases of fever began to exceed a certain proportion of all the cases of disease in a ward, the fever began to affect the nurses, who were constantly present, and therefore much exposed to the infection; and when the proportion became still greater it affected also the students, who were less exposed than the nurses, but more than the physicians, and when increasing still, it affected also the physicians themselves.

But if the impure air had been constantly carried off that would not have been the case?——It would not.

Do you consider that all the circumstances affecting the discipline of hospitals ought to engage the attention of the Boards of Health, as, for instance, connected with the disposition of the apartments, and the question of mixing fever patients with other cases in the same ward?——I think that such matters may be left generally to the medical men of the hospital.

Is it not the case that in some hospitals the fever patients are mixed with the others in the same ward?——It is. The experiments of which I was speaking were made in the Infirmary of Edinburgh. It was there found that in wards occupied by fever patients only the nurses and other attendants rarely escaped the infection; but when such patients were scattered about so as to dilute the poison, the attendants remained safe, as did also neighbours in the beds about them, proving that dilution of the contagious poison, by scattering the patients, as well as the complete ventilation of a fever ward, affords safety.

Does not the placing fever patients in other wards sometimes convey disease to others?——It appeared at Edinburgh that this did not happen in well-ventilated wards. It would be possible to increase the security very much by placing canopies, or covers, over the separate beds, to receive the breath and exhalations from the patient's body, and through channels rising from the canopies to send the foul air directly to a ventilating apparatus. It is known that a canary-bird, suspended near the top of a curtained bedstead in which people have slept, will generally, owing to the impurity of the air, be found dead in the morning; and small close rooms in the habitations of the poor are sometimes as ill-ventilated as the curtained bedstead.

Have you observed that in houses where the windows are very close, the attics and upper rooms have frequently a very offensive eil Arnott, Esq., M.D.

smell?——If rooms are close, impure air remains long in them and any change of air takes place chiefly where the air is purest, near the bottom of the room, through the fire-place. In rooms with fire in them, the air required for the fires enters from the staircase or windows.

Have you considered the practicability of improving the supply of water either in quantity or quality?—— Persons residing in London are not so well supplied as the inhabitants of New York, for instance, where a river has lately been conducted into the town, giving four times as much water to about 400,000 inhabitants as enters London for about 2,000,000; but it would be quite possible here to increase, to any amount, the quantity of excellent water taken from the Thames at a suitable distance above the town.

Would it not be of great advantage to the salubrity of London, or any other large town, if the volume of water supplied was increased?——There can be no question of the great importance of an abundant supply.

Have you considered the practicability, or the advantage if practicable, of keeping it on always at high pressure?——I think that could not be conveniently done with one set of pipes, for persons from negligence or evil intention might at any time open so many of the cocks in houses as to lessen or destroy the high pressure. Unless there were some certain means of keeping the cocks closed, except at stated times, it would be better to have separate sets of pipes for high and low pressures.

Are you aware of the regulations enforced in Philadelphia upon that subject?—No.

Or the regulations enforced in New York, where they propose to extinguish the danger of fire altogether?——No; but I think the safer plan would be to have a separate set of pipes for high pressure, which nobody should touch but the firemen, or other appointed persons. I think the expense of that would be less than of any contrivance that should give even tolerable security in the other way.

You think the expense of a separate set of pipes would be, in fact, a great economy?——I think it would; and the expense of such a set for the purpose of extinguishing fires would be small compared with that of the larger pipes for the ordinary supply of houses.

Have you paid any attention to the effects produced by impure water, or water not perfectly purified, supplied to towns?——I think in some instances much evil has resulted from impurities, but such water as is obtained in London from the Thames, above the tide-way, is very good.

Such water contains 14 grains of carbonate of lime in a gallon of water. Is not it often found that hard water is apt to produce

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costiveness?——A change of water may, but when a man is accustomed to such water, the stomach generally accommodates itself to it.

In an economical point of view, would it not be important to examine into the softness of water on account of the expense of soap, where the water is hard?——I think it would.

It has been suggested that deep wells might be made in London to take the deep water, and it has been stated that such water contains carbonate of soda of medicinal qualities; would you consider that such water ought to be taken as a regular beverage?——Certainly not, where purer water can be obtained. Absolutely pure water is offered scarcely anywhere by nature, but such water as is found in the streams of England and Scotland is generally very suitable. I believe the Thames water, taken from above the tideway, to be very good.

But there might be means employed for purifying the water and making it soft, which might be of use?——Yes; as for the purpose of saving soap in washing.

Have you any suggestions as to the expediency of improving the sites of new dwellings in the suburbs of old towns?——The site should be such as to allow of a proper drainage and a proper supply of water; these are essential things. If houses were placed near to marshes, or in low damp situations, it would be a serious fault.

You think that effectual drainage would be very important?——It would.

From your acquaintance with the general state of large towns, and particularly the metropolis, do you think the humbler classes stand in need of some strenuous exertion to be made through the medium of the proper authorities for the improvement of the drainage, and of the structure of their dwellings, and cleansing, and various other matters relating to their health?——I have always believed that nearly half of the accidental illnesses, that is, of illnesses not resulting from old age, that occur among the lower classes might be prevented by proper public management.

You have given a table, in which you state the necessaries for sustaining health, which you have classified under four heads; the first, air; the second, temperature; the third, aliment; and the fourth, exercise. Do any of those come, in your opinion, within the province of public administrative regulation?——I believe the air does. If you allow sources of aerial impurity to exist in or around dwellings, you are poisoning the people; and while many may die at early ages of fevers and other acute diseases, the remainder will have their health impaired and their lives shortened. An unhealthy race will have arisen in consequence of the great defect.

Will you have the goodness to deliver in a copy of the table just referred to?

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THE FOUR NECESSARIES.

In Fit kind and degree.	In Deficiency, or of Unfit kind.	In Excess.
1. Air	Suffocation Unchanged air.	Excess of oxygen.
2. Temperature	Cold (intense)	Heat (intense).
3. Aliment:		
Food	Hunger or bad food	Gluttony or surfeit.
Drink	Thirst	Swilling water.
4. Exercise:		
Of the body	Inaction, or	Fatigue or exhaustion.
Of the mind	Ennui Certain depressing passions—as fear, sorrow, &c.	Want of sleep. Certain exciting passions—as anger, jealousy, &c.
Of the mixed social aptitudes.	Solitude	Certain kinds of debauchery.

THE TWO KINDS OF NOXIOUS AGENTS.

1. Violence:—
   Wounds—Fractures—Dislocations—Burns—Lightning, &c.
2. Poisons:—
   Animal, Mineral, Vegetable.

Certain of these, such as alcohol in its various forms, opium, tobacco, &c., which in large quantities kill instantly, when they are taken in very moderate quantity can be borne with apparent impunity, and are sometimes classed as articles of sustenance; or they may be medical, but, if taken beyond such moderation, they become, to the majority of men, destructive slow poisons.

Contagious—as of plague, small-pox, and measles.
Malaria of marshes, thickets, and filth.

It has been stated, that in the course of experience it has been found practicable on going into a school to select the children living in the worst districts by their appearance?——I should think that very likely.

In towns, which are increasing rapidly in population, and where buildings are constantly extending over the suburbs, do you think it would be right that the authorities should in some way reserve open spaces for the purpose of exercise for the humbler classes of inhabitants who may not be able to go to a distance, in the nature of public walks, or something of that kind?——I would deem it very important; and, independently of mere health, it seems cruel to let individuals grow up from their infancy to maturity almost without seeing an open field.

Is it not also greatly for the health of the children that they should be able to walk out in some place of that kind with their parents?——Certainly.

Have you observed a great want of those in the vicinity of many populous towns, and especially on the east, on the north, and on

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the south of London?——The inhabitants there have to go considerable distances to get into the fields; and in many places I believe the fields which exist are shut against them.

Do you consider that in the present state of physical depression of many of the lower classes they would receive as a boon such measures of amelioration as it might be possible to adopt for their relief?——I think they would; but at present many of them are not aware of the want; they believe these evils to be the unavoidable lot of the human race. They are, for instance, very ignorant of the nature and importance of ventilation.

What is your opinion of the amount of evil with regard to the state of the atmosphere which arises from slaughter-houses and crowded burial-grounds in cities?——I have no doubt that they are injurious; though, I believe, they are not so injurious as the general contamination of the atmosphere arising from all the drains being open. I know many persons who cannot come into London, to go through the streets, without having an asthmatic oppression from this cause. I think it would be very important to make the entrances and outlets of drains air-tight.

Do not slaughter-houses contain the same sort of miasmata?——They furnish part of the impurities of the drains. It is often possible for a person walking in the streets in the dark, or with the eyes covered, to tell when he approaches the open grating of a drain, by the offensive smell issuing from it.

Would not the system of a supply of water, by flushing, which should remove whatever was in the drains once a-day, before decomposition could take place, be an effectual remedy?——It would lessen the evil; but I think to remove it effectually the drains must be shut up or trapped, and escape allowed for their impure air by lofty chimneys, in which it may be heated and partly burned. A chimney has been made in Glasgow recently 100 feet higher than St. Paul's church in London, to carry away the offensive vapours of chemical works.

Would not the chimney require to be extremely high, for if the smoke descends from ordinary chimneys, would not the maismata sent up from the sewers be apt to descend?——After smoke issues from the chimney the solid particles in it gradually come down as dust or flakes, but no solid matter rises from drains.

Is not there a good deal of carbonic acid?——There is from common chimneys, but from the drains there are also quantities of hydrogen mixed with the mass, and not disposed to come down. I think the impurities of the drain would not come down again, if heated and sent up by a lofty chimney.

Would not you consider it indispensable, in case chimneys were employed for ventilating the sewers, that the gases that went up should be burnt?——It would be desirable at least to give so much heat to them that there would be little chance of their coming

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down again. I believe that even carbonic acid, heated and sent up to a considerable height, would mix and remain with the air, and that it would not descend again within a moderate distance.

Do not you think that there is a want of some additional authority for the purpose of preventing nuisances injurious to health in the vicinity of large towns?——I think there is.

Would not the erecting of chimneys be proceeding upon the old system of allowing decaying animal matter to exist in the drains, which would not be necessary if a system of flushing were generally introduced, and no decaying matter were allowed to exist in the sewers; and would it not be better, instead of providing by that plan for the evil that now exists, to remedy the evil?——Nothing can prevent the drains which carry away all the liquid, and many of the solid impurities of a town, from being filled with offensive effluvia, even if there be a good declivity in all the drains, and a rapid current. Flushing is properly the remedy only for the want of a sufficient declivity.

Would it not be better to keep the sewers always clean, by a system of flushing, than to legislate for an evil that might be remedied?——Flushing, in defective drains, would lessen the quantity of impure air produced in them, but would not free the town from the amount, which is unavoidable.

Are you aware that the mode of introducing animal food into London now is such that a great portion of it must be carried off by drains, and left to decompose, not being useful for food?——Evidently this must be the case.

By introducing living animals, and slaughtering them in different parts of the town, you bring into it, ostensibly for food, the whole of the animal—perhaps only two-thirds of the animal being really useful for food?——Yes.

Should you be of opinion, that since the unnecessary part of the animal must either remain to decompose, or be carried out of a town, or be an additional accumulation to be carried off by drains, that unnecessary quantity should be prevented being brought to the town?——I should deem it almost a reason for making it a law that the slaughtering of animals should take place out of the town altogether.

Then there is another class of animal substances decaying in large towns which the drains cannot carry away, namely, the contents of crowded burial-grounds. What is your opinion of the effect of those burial-grounds upon the atmosphere?——There is no question that they render it in a degree impure, offensive, and injurious. I have not looked into the evidence very carefully as to positively ascertained effects from that cause, but there can be no doubt that it is hurtful. Common instinct makes men loathe the idea of the impurity from such a cause.

JOSEPH TOYNBEE, Esq., F.R.S., Surgeon, examined.

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You are one of the surgeons of the St. George's and the St. James's Dispensary?——Yes, I am the senior surgeon, and for several years I visited the patients of the Westminster General Dispensary at their homes.

Is it not part of your duty to visit the out-door patients at their own houses?——Yes it is, I visit cases daily in the neighbourhood of Golden-square and Grosvenor-square, large portions of which are inhabited by persons in the poorest condition.

In a statistical report made by Mr. Weld, on a house-to-house visitation made at the instance of Lord Sandon to the Statistical Society in 1842, it is stated that there were in the parish of St. George's, Hanover-square, 1465 families of the labouring classes, who had for their residence only 2175 rooms and 2510 beds. The distribution of rooms and beds was as follows:—

Dwellings.	Number of Families.	Beds.	Number of Families.
Single rooms for each family .	929	One bed to each family . .	623
Two ,, ,, .	408	Two ,, ,, . .	638
Three ,, ,, .	94	Three,, ,, . .	154
Four ,, ,, .	17	Four ,, ,, . .	21
Five ,, ,, .	8	Five ,, ,, . .	8
Six ,, ,, .	4	Six ,, ,, . .	3
Seven ,, ,, .	1	Seven,, ,, . .	1
Eight ,, ,, .	1	Dwellings without a bed . .	7
Not ascertained	3	Not ascertained	10
Total . . .	1,465	Total . . .	1,465

How far does this state of the occupation of the rooms accord with your own observation?——In the class of patients to our dispensary, nearly all the families have but a single room each, and a very great number have only one bed to each family. The state of things in respect to morals, as well as health, I sometimes find to be terrible. I am now attending one family, where the father, about 50, the mother about the same age, a grown up son about 20, in a consumption, and a daughter about 17, who has scrofulous affection of the jaw and throat, for which I am attending her, and a child, all sleep in the same bed in a room where the father and three or four other men work during the day as tailors, and they frequently work there late at night with candles. I am also treating, at this present time, a woman with paralysis of the lower extremities, the wife of the assistant to a stable-keeper, whose eldest son, the son by a former wife, and a girl of 11 or 12

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years of age, all sleep in the same bed! In another case which I am attending in one room, there are a man and his wife, a grown up daughter, a boy of 16, and a girl of 13; the boy has scrofulous ulcers in the neck; the father, though only of the age of 49, suffers from extreme debility and a broken constitution. As another exemplification of this state of things, I may mention the following instance rather extraordinary in its facts, but an example of the overcrowding of some of these places. In the course of the first months that I was attached to the dispensary, an aged Irish woman applied to me with a broken rib; she declined going into an hospital; the dispensary therefore supplied her with a flannel roller, and I promised to visit her and apply it. On reaching her *home,* I found that it consisted of one corner of a room on the first floor of a house in Peter-street. The landlady of this room, who herself occupied the central part, near the fireplace, had tenants in the other three corners, in one of which was a widow with three or four children. I applied the bandage to my patient, who went on, to use her own words, *very comfortably* for four or five days, at the end of which time I found her in considerable pain from the following cause:—Not being able to go out as usual with her basket, to sell fruit and vegetables, she could not pay her daily rent, and therefore, on the suggestion of the landlady, consented to under-let half of her bed; but it happened unfortunately, that the new tenant being bulky in person, occupied more than her fair proportion of the joint tenancy, so as to press against the broken rib of my poor invalid, and displace it, thus producing a recurrence of the pain and suffering from which she had but just been freed.

What do you find generally the state of the rooms which are so crowded?——Wretched, extremely close, so close that, for self-protection, I am obliged to have the windows open during the visit; they are not only close apparently from overcrowding, but they frequently contain noxious odours; the usual source of such odours, so far as it can be detected, is sulphuretted hydrogen arising apparently from the privy, and from the neglected drains. Odours from these sources are frequently to be traced to the top of the house. In certain states of the weather, they are intolerable even to the inmates, who are scarcely conscious of the existence of the ordinary odours.

One cause of the defective ventilation of the rooms in these districts inhabited by the poor is, that the windows never open at the top. The opening at the bottom frequently gives an inconvenient rush of cold air, which I have known to be productive of very bad results. The clothes of the poor people living in these places often contract such a smell that I have known a patient who has remained a few minutes in the room leave such a taint in it as was only to be removed by throwing open the windows and ventilating it.

Were there generally sewers in the fronts or near to the houses

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which you have visited?——In some streets and courts there are no sewers; in others, in which there are sewers, there are scarcely any drains from the houses into the sewers, and the gully-holes are so far apart that the slops thrown out from the street door mix with the dirt of the street, and very little of the fluid appears to arrive at the sewer. There are great complaints that the gully-holes emit very offensive smells.

What do you find to be the effect of defective ventilation, and the atmospheric impurity apparent as causes of disease?——The defective ventilation appears to me to be the principal cause of the scrofulous affections, which abound to an enormous extent amongst our patients. When I have had a scrofulous patient come before me, I have always been able to trace this as one of the agents. I am not prepared to state that other causes may not produce this disease, but I am prepared to state that I believe this is the greatest cause in our district. We find as accessories the want of personal cleanliness, badly chosen and badly cooked food, and defective clothing. My observation is very generally corroborative, however, of the view taken by Monsieur Baudelocque, who in a treatise, "Observations sur les Maladies Scrofuleuse," states that the repeated respiration of the same atmosphere is the cause of scrofula; that if there be entirely pure air, there may be bad food, bad clothing, and want of personal cleanliness, but that scrofulous disease cannot exist. He gives such facts as the following:—

"The development of scrofula is constantly preceded by the sojourn, "more or less prolonged, in air which is not sufficiently freshened. This "is the only cause which is always met with isolated, or united to circumstances whose action is very secondary. Seeing that scrofula spares "children born of scrofulous or of syphilitic parents, and children of a "lymphatic temperament, uncleanly, badly clothed, badly nourished, "and brought up in a cold and humid country—seeing that it attacks "children whose parents and grand-parents have always enjoyed the best of "health, children—of a sanguine, bilious, or other temperament—placed, "too, in the most advantageous circumstances, as regards cleanliness, "clothing, and food, and brought up in a warm and dry climate, it is impossible to deny that hereditary disposition, syphilis, the lymphatic "temperament, uncleanliness, want of clothing, bad food, cold and humid "air, are of themselves circumstances non-effective for the production of "scrofula.

"When it is seen, on the other hand, that this disease never attacks persons who pass their lives in the open air, and manifests itself always "when they abide in an air which is badly renewed, and this whatever "may be the extent of the other causes enumerated above, is it not evident that the non-renewment of the air is a necessary condition in the "production of scrofula?——If this cause has not always been recognized "and pointed out, that arises from the importance attached to secondary "causes, which, having once perceived, inquiry has not been carried further. Invariably it will be found, on examination, that a truly *scrofulous* disease is caused by a vitiated air, and it is not always necessary "that there should have been a prolonged stay in such an atmosphere. "Often a few hours each day is sufficient, and it is thus they may live in "the most healthy country, pass the greater part of the day in the open "air, and yet become scrofulous, because of sleeping in a confined place,

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"where the air has not been renewed. This is the case with many shepherds. It is usual to attribute scrofula in their case to exposure to storms and atmospheric changes, and to humidity. But attention has not been paid to the circumstance, that they pass the night in a confined hut, which they transport from place to place, and which guarantees them against humidity; this hut has only a small door, which is closed when they enter, and remains closed also during the day; six or eight hours passed daily in a vitiated air, and which no draught ever renews, is the true cause of their disease. I have spoken of the bad habit of sleeping with the head under the clothes, and the insalubrity of the *classes* where a number of children are assembled together. The repetition of these circumstances is often sufficient cause of scrofula, although they may last but for a few hours a-day."

He gives the following instances:—

"At three leagues from Amiens lies the village of Oresmeaux; it is situated in a vast plain, open on every side, and elevated more than 100 feet above the neighbouring valleys. About 60 years ago, most of the houses were built of clay, and had no windows; they were lighted by one or two panes of glass fixed in the wall; none of the floors, sometimes many feet below the level of the street, were paved. The ceilings were low; the greater part of the inhabitants were engaged in weaving. A few holes in the wall, and which were closed at will by means of a plank, scarcely permitted the air and light to penetrate into the workshop. Humidity was thought necessary to keep the threads fresh. Nearly all the inhabitants were seized with scrofula, and many families, continually ravaged by that malady, became extinct—their last members, as they write me, died *rotten with scrofula*.

"A fire destroyed nearly a third of the village; the houses were rebuilt in a more salubrious manner, and by degrees scrofula became less common, and disappeared from that part. Twenty years later another third of the village was also consumed; the same amelioration in building, with a like effect as to scrofula. The disease is now confined to the inhabitants of the older houses, which retain the same causes of insalubrity. I ought to add, that there is more wealth in the country,—that the weaving of linen has been superseded by that of cotton, for which moisture would be hurtful, and darkness inconvenient, and that in consequence of the division of landed property, many of the peasants possess a little land which they cultivate between times. But all these advantages are common to the quarter which has not been burnt with the two others, and in the mean while there is always scrofula in the first, and never in the others. The difference seems to me to be clearly referable to the difference in the habitations. If, in the old quarter the number of the scrofulous is less considerable than formerly, it is necessary to attribute it to the circumstance of the inhabitants being less sedentary, and their going more often to the fields,—the purity of the air respired during the day diminishes the noxious effects of that which is breathed during the night.

"In this village exists a numerous family, which may furnish matter for instructive remarks on the cause of scrofula: this family, very poor, live in a house with two rooms, dark, low, sunk below the ground, unpaved, constructed of clay, where air and light can find no entrance save by two doors, of which the one opens upon the court and the other into the garden; the second room is much worse lighted, and the external air is much more impeded. The father is 47, hump-backed, and of a weak constitution; the mother is robust (but she was born of a scrofulous woman); they have had eight children, two died early, six are living; the eldest, aged 20, is dreadfully afflicted with scrofula, of which his body bears many scars. From his birth till he was seven,

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he was healthy, but at that age an abscess formed near the angle of the lower jaw; he was sent to school till 11; he was then placed in a cotton velvet manufactory: various scrofulous abscesses soon broke out in the groins, thighs, towards the great trochanter, beneath the left clavicle, &c. A sister, aged 18½, presents unequivocal traces of rickets and scrofula; four others who are younger enjoy good health. These six children have been brought up under very different atmospheric influences; during the first years of his marriage the father was a weaver, and the afflicted eldest son scarcely quitted the house, and slept habitually with his parents. When he ceased to attend school, he was put to a sedentary employment. At a later period the father left the loom and became day-labourer; the mother tended pigs, and the children did not rest at home, but from the time they could walk, the mother took them with her to the fields, or sent them begging.

"Here we have a scrofulous man,—his wife, born of a scrofulous mother, giving birth to eight children, two of whom died young. Of the six yet living, four escaped entirely the scrofulous disease; the eldest, on the contrary, is heavily afflicted, and the second bears marks.

"Whence the difference in the health of these children? They cannot allege the youthfulness of the parents at the moment of fecundation, because the parents were 26 when they married; nor the too great age, because four children born since are quite exempt from scrofula. There was somewhat less poverty in the first years of marriage than since; the eldest children were better nourished and better clothed. The boy especially has always been placed in more favourable conditions for nourishment and cleanliness than the others. Working very young in a cotton factory, and earning a little money, he was better nourished and clothed, and afterwards, in consequence of sickness, he was the object of most care. Bad nourishment and want of cleanliness cannot therefore be here said to have caused the evil. Its true cause appears to me to reside rather in the difference of the atmospheric conditions in the midst of which these children have been elevated. The younger, constantly in the open air, breathing always a pure air, are very strong, and have never presented a trace of scrofula; and yet they were badly nourished, badly clothed, and exposed to all weathers; the elder, on the contrary, habitually shut up, plunged in a vitiated air, is deeply *scrofulous*,—he was better nourished, better clothed than the others, and always protected from atmospheric vicissitudes."

In speaking of the hereditary descent of the disease, he says—

"The cases I have stated appear to me to throw a broad light on the influence which it exercises in the production of scrofula. Is it not remarkable that of eight children born of such parents, one alone has been severely afflicted, and that, too, precisely the one who has been brought up under circumstances such as would have made it scrofulous had its parents never been so? This observation diminishes the importance generally attached to hereditary constitution as a cause of scrofula, and it shows besides that it is possible to destroy the resulting predisposition, and to avoid the malady, and also by what means.

"Facts prove that parties may be born scrofulous; but then the mothers must be scrofulous at the moment of conception, and during the greater part of her gestation live in the midst of circumstances which have excited and which support the disease. The materials that she furnishes to the support of the fœtus should have the same effects on it as on her. It will be formed entirely, so to say, of scrofulous elements, and nine months are more than sufficient for the symptoms of scrofula to manifest themselves outwardly.

"When the parents have ceased to be scrofulous they can only transmit to their children a predisposition to the disease of which they are cured.

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"That this disease be developed, it is necessary that the children find themselves placed under the atmospheric condition of which I have spoken; that they habitually respire an air whose principal constituents are altered. In consequence of their predisposition to scrofula, it is true it will show itself more readily in their case than in that of other children exposed to the same cause; but the action of a vitiated air is always necessary to the development of the disease: to withdraw from the one is to avoid the other, whatever may be the hereditary predisposition.*

"It is rather to the disposition of the places than to the substance employed that scrofula ought to be attributed. Professor Alibert has well observed, that the workmen employed at Meude, in the fabricating of *cadis*, a kind of coarse woollen serge, are *nearly all scrofulous;* but it should be observed, that they prepare the wool without oil, and that to work the easier they work in low and vaulted shops, where the air is soon altered, and is but slowly and with difficulty renewed.

"As to wool, I will mention a remarkable fact, communicated by Mons. Regnault. At Aubigny, a small town of the Department du Cher, scrofula, and *le teigne faveuse*, scrofulous eruption, are much spread among the working class, and to such a degree, that it is often impossible to complete the number of soldiers for the annual conscription, la teigne faveuse being, as is known, a cause of exemption. The disease is generally observable among the woollen workmen; but the greater part of the houses of business are very damp, lower than the grounds, imperfectly lighted by very small windows, *never opened*, or by panes fixed in the wall, the ceilings being low. The workpeople seldom go out, except for an hour or two in fine weather; and during the night the re-union of all the family, in proportion as it is numerous, and the door closes more exactly, alters still more and more quickly the air already vitiated. There is no need to suppose a special action of the wool to explain the frequency of scrofula; it matters not what material is manufactured; when the workpeople are placed in the circumstances just mentioned, scrofula will soon appear."

"The above details I owe to M. Andrieuse, a young man full of zeal for science, whose father has practised medicine for 40 years at Oresmeaux, in succession to his father and his grandfather."

The following case is related by Baudelocque, on the authority of Dr. Blache, Doctor of the Central Bureau of the hospitals. I cite it in illustration of cases of a somewhat similar character,

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* Mr. Baudelocque states, in reference to locality—"There are countries where, independent of the mode of living of the inhabitants, scrofula is endemic. This is owing to the locality. This is the case with villages built in the narrow gorges formed by the approach of elevated mountains, as is seen in the Alps and Pyrenees, and especially in those of the valley of the Rhone. The air respired habitually in these gorges is *stagnant*, *humid*, *warm*, and *corrupt;* its renewal is very difficult. Ordinarily this renewal can only be effected by the displacement of the upper strata which are continually affected by the winds. Occasionally the direction of the wind corresponds with the line of the gorge; and then there is a more rapid and effectual renewal. But there always remains a part which, being arrested by the bottom of the gorge, is, as it were, heaped back on itself, momentarily compressed, but not displaced, or therefore not renewed.

"The renewal of the air is not so light a matter as is supposed. To effect it, a *simple communication is not sufficient*, a mere contact of the external and internal air. It is necessary that one or more currents exist to multiply that contact, and cause the pure air to pervade that which is vitiated. I believe one of the principal offices of the winds is to maintain the uniform composition of this air by continually agistating it, so as to mingle that which has lost a part of its oxygen with that which is surcharged."

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which have fallen under my own observation, and in which I have been consulted both in London and the country.

> "A child living at Versailles, of the age of eight or nine years, was attacked with scrofula, and put under my iodine treatment. At the end of about six months the state of the child had not at all improved, notwithstanding scrupulous exactitude in the administration of the remedy. Dr. Blache was then consulted, to whom I had just communicated my ideas on the true cause of scrofula. In examining into the mode of living of the child, Dr. Blache learned that he passed the night in a very small room, and that he had the bad habit of sleeping with his head under the bed-clothes. He perceived that here laid the cause of the want of success in the treatment. He gave the most judicious advice in this respect, and renewed the use of iodine. Scarcely a fortnight had passed before a very great amendment was perceptible in the disease; this amelioration has continued, and now its health is completely re-established."

Do your colleagues who have had equal experience with yourself coincide with you as to the causes of scrofula?——In all the conversation I have had with them on the subject they do. Dr. Blakely Brown, who has visited even more patients than myself, and who has read the statements I have submitted to the Commissioners, confirms my remarks in all particulars. I observe that Dr. Duncan, in his Report on the sanatory condition of Liverpool, adopts similar views, and refers to the authority of Her Majesty's physician. He says—

> "But the operation of these physical causes is not confined to the generation or extension of fever. When acting with a less degree of intensity, there may still be sufficient to affect the general health; and in fact, they do deteriorate the health of those exposed to their influence, and call into action the latent germs of other diseases. It would be a waste of time to point out the way in which the general health is injured by the habitual respiration of contaminated air, but there are one or two diseases whose existence seems specially favoured by this circumstance, and to these alone I shall call your attention. The first I shall notice is consumption.
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> "It seems natural to expect that the organs with which the foreign gaseous ingredients of the atmosphere come more immediately into contact, and whose blood-vessels they must enter on their passage into the system, should feel in a distinctive manner their noxious influence; and this *à priori* expectation is strengthened by observation both in man and animals, as well as by experiment on the latter. It has been observed that where individuals breathe habitually impure air, and are exposed to the other debilitating causes which must always influence, more or less, the inhabitants of dark, filthy, and ill-ventilated dwellings, scrofula—and consumption, as one of its forms—so very apt to be engendered, even where the hereditary predisposition to the disease may be absent. Professor Alison, one of the highest authorities on this subject, remarks:—'It is hardly possible to observe separately the effect on the animal economy of deficiency of exercise and deficiency of fresh air, these two causes being very generally applied together, and often in connexion with imperfect nourishment. But it is perfectly ascertained, on an extensive scale, in regard to the inhabitants of large and crowded cities, as compared with the rural population of the same climate,—first, that their mortality is very much greater, especially in early life, and the probability of life very much less; and, secondly, that of this great

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"early mortality in large towns, a very large proportion is caused by "scrofulous disease. And from these two facts it evidently follows, that "deficiency of fresh air and of exercise are among the most powerful and "the most important, because often the most remediable, of the causes "from which the scrofulous diathesis arises.'* Sir James Clark, who has "written the best monograph on consumption in our language, regards "'the respiration of a deteriorated atmosphere as one of the most powerful "causes of tuberculous cachexia,' (*i. e.* the constitutional affection which "precedes the appearance of consumption). He says, 'If an infant born "in perfect health, and of the healthiest parents, be kept in close rooms in "which free ventilation and cleanliness are neglected, a few months will "often suffice to induce tuberculous cachexia.' 'There can be no doubt,' "he adds, 'that the habitual respiration of the air of ill-ventilated and "gloomy alleys in large towns is a powerful means of augmenting the "hereditary disposition to scrofula, and even of inducing such a disposition *de novo.* Children reared in the workhouses of this country, and in "similar establishments abroad, almost all become scrofulous, and this "more, we believe, from the confined impure atmosphere in which they "live, and the want of active exercise, than from defective nourishment.' "The same distinguished physician has actually succeeded in inducing "consumption in rabbits, by confining them in a cold, dark, damp, close "situation, and supplying them with innutritious food. Monkeys present "the same phenomenon in this country, where they are often crowded "together during the winter in a confined and heated atmosphere, and "where true tubercular comsumption commits more extensive ravages "among them than it does even among the human race. It is known, "also, that this malady is very prevalent among the cows which supply "milk to the inhabitants of some large towns, where they are immured "during part of every year in dairies perfectly closed, and which, being "too small for the number of animals they contain, soon become filled "with heated, vitiated air, for the removal of which no provision is "made."

The general climate, the cold, the damp, and the soil, were at first accused of the excessive mortality amongst the animals in the Zoological Gardens, but it is now clearly ascertained that it principally arose from defective ventilation. During the two years that I held an appointment at the College of Surgeons, I made a number of dissections of the animals which had died in the Zoological Gardens. I found that scrofula was by far the greatest cause of their mortality. Whether the disease attacks the bones, the joints, or the lungs, the diseases are of a scrofulous character. A few days ago, the fine lion which died there had a scrofulous affection of the bones and joints of the paw. Since the dens have been properly ventilated, the previous complaints have much diminished; and it has been observed that the animals have become more ravenous, and that some have attacked and destroyed each other.

But do you find the operation of this one cause—the atmospheric impurity arising from overcrowding and defective ventilation—attended only by one form of disease?——The forms of scrofula I find are various: we have scrofulous affections of the eyes, called sore or inflamed eyes, which are very frequent; scro-

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* Outlines of Pathology and Practice of Medicine, p. 194.

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fulous affections of the joints, called by the people themselves abscesses—the abscess being in the neighbourhood of the joint, and they have no idea that they communicate with the joint; this disease frequently attacks the hip-joint. The defective ventilation may be considered one great cause of all the diseases of the joints which we so frequently meet with, as well as of the diseases of the eye and the skin; the diseases of the skin, herpetic diseases, are called shingles, lepra, *porrigo*, or ringworm. The disease of hydrocephalus, or water in the brain, so fatal to children, I find associated with symptoms of scrofula, and arises in abundance in these close rooms. I believe water in the brain, in the class of patients whom I visit, to be almost wholly a scrofulous affection.

The general depressing influences affect most injuriously the most sensitive or weakest organs. Besides the eye, the ear is, I believe, injuriously affected by them. Amongst other forms of disease, which I think ascribable to the influence of vitiated air, is a large amount of what has not hitherto been ascribed to it, namely, deafness. In justification of this opinion, I may state that I have already made between 500 and 600 dissections of ears, with the view of determining the seat of this particular disease. One hundred and twenty of these cases I have submitted to the consideration of the profession in the twenty-sixth volume of the 'Medico-Chirurgical Transactions.' The general effect observable is the thickening of the membrane of the middle ear. This membrane is semi-transparent, and, being extremely sensitive and delicate, is, I believe, injuriously affected by the contact with the vitiated air, and debilitated by it; inflammation and other diseases are induced by the access and pressure of cold air on leaving heated rooms to go out into the colder atmosphere. The delicate membrane of the ear, it is to be recollected, is longer exposed to the depressing influence of the vitiated air than any other part of the body. On leaving a room the surface of the body is relieved from the continued access of the vitiated air, whilst the quantity of vitiated air contained in the middle ear remains for a considerable time, and is only slowly removed. The suspicion which I had formed from the dissections, that the cause of deafness is dependent upon the contact of foul air, appears to me to be corroborated by the fact, that at least double the number of children of the labouring classes are affected by ear-ache and deafness than children of the rich and better conditioned classes less exposed to the like influences.

Have you observed any difference in the effects of medicine produced by different states of overcrowding or different states of atmospheric impurity?——In the crowded rooms, as a general rule, the diseases are excessively difficult to manage. In the less crowded and more cleanly habitations the mortality is not so great; diseases are less severe, and last a shorter time, and do not

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leave behind them the same shocking effects on the system. When ventilation has been applied to the rooms where it is needed, the patients have improved rapidly.

Have you been led to recommend the introduction of ventilation as an effectual and comparatively permanent remedy?——Yes, I have. The publication of the evidence contained in the Sanatory Report drew public attention to the importance of the ventilation of dwellings and workshops. I adduced the facts there given (which coincided with my own observations) in a Report which led to the formation of a Committee of the Governors of the St. George's and St. James's Dispensary, and the establishment of a Samaritan Fund, in connexion with the charity, one object of which is to improve the ventilation of the apartments of sick patients. It was generally acknowledged by the Committee that ventilation was one of the most important curative means. The new fund is placed under the care of my five colleagues and myself, I being the honorary secretary to it. The objects are to ventilate the habitations of the sick poor, and to provide them with flannel and nutritious food. The fund has been of the greatest service in carrying out ventilation.

Will you describe the ventilation you have introduced?——I advised with a number of persons, and the means adopted were these:—First. A ventilator for the admission of external air through the windows, consisting of a plate of zinc, very finely perforated with 220 holes to an inch. The use of perforated zinc was suggested to me by Mr. Cottam, the engineer, of Winsley-street, Oxford-street, who, having observed the great value of its application by myself in ventilating the rooms of the poor, has lately made use of it in the ventilation of the whole of his extensive establishment. The size of the window ventilators varies from 4 to 12 inches square, according to the size and construction of the room. They are generally introduced in the uppermost portion of the window, and in the corner pane the farthest from the fire-place. These fine orifices prevent the air coming in with a rush, which would occasion discomfort, and tend to diffuse the air equally and gently throughout the apartment. In the tap-rooms of public-houses a revolving ventilator is introduced, which is objectionable, not only in letting in air suddenly or in large quantities, but in making a noise by its revolutions, and being liable to be stopped up. Besides the window-ventilator, we have introduced a chimney-ventilator, to remove the vitiated air from the room.* It was contrived by Dr. Arnott, who was consulted on the subject. This consists of a square iron tube, of from 3 to 6 inches in diameter, and so

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* The later experience of these chimney-ventilators proves that the size of the chimneys and the badness of the draught render the benefit to be derived from them very uncertain. Their use is now nearly discontinued.

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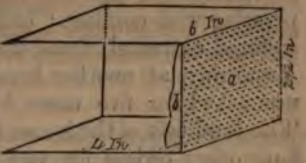
long that the outer orifice should be flush with the wall of the apartment, and the inner one enter the chimney. These tubes are usually from 4 to 6 inches in length. At the orifice entering the room there is either a plate of perforated zinc or a piece of fine wire-work; from the upper and back part of which hangs a piece of ordinary or oiled silk, which acts as a valve so as to allow the warm and vitiated air to pass up the chimney and prevent any smoke from entering the room.



Have you considered that the apparatus you have introduced might be further improved, to attain the desideratum of a cheap self-acting ventilator with air that is warm as well as fresh?——I have certainly considered that it might be improved, and that it will be improved when attention commensurate with the great importance of the subject is given to it, and a certain amount of further experience is had upon it.

What is the expense of the ventilators now successfully used?——For each window-ventilator, and the expense of fixing it, is 2*s.*; for each chimney-ventilator, and the expense of fitting it, 3*s.* The expense would be less if the houses did not lie so far apart, and if more were put in at one time.

If a neighbourhood of several hundred houses were ventilated at once, what do you conceive would be the expense?——I expect not one-half of the present expense.

What have you observed of the effects produced by these means of ventilation?——The effect on the health of the patient, I have observed, is to accelerate the cure and to alleviate the symptoms so as to give great comfort to the patient. The general observation of the inhabitants, as well as the patients, is, that the room is "much more comfortable and airy;" the smells from the abscesses are very disagreeable, and in close rooms sometimes insupportable. The people remark that the ventilation has carried away the smells and purified the place. They have frequently said that they have been in so much better spirits since they have had these ventilators, and have always been most grateful for them; they have often been more thankful for the ventilators than for the flannel and bread and milk. I am now continually applied to by the friends of those whose rooms have been ventilated to bestow upon them a similar boon. In one at No. 8, Duke-street, Grosvenor-square, I commenced with one ventilator to a room, and, on the experience of this one, and the praises given of it by the patients, the inmates of the other rooms applied to me for ventilators. I have put ten ventilators there on the stairs and landing, and the whole of the people there express a very high sense of the comfort they have experienced. In the first room the smell was so bad that I could not enter into or remain in it, unless the windows were

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opened. I can now go there without annoyance. Tailors working at home have told me that they can now use the hot irons for pressing with comfort; before the ventilators were introduced they suffered extremely from the heat and depression consequent thereon. Yesterday, at another house, where I had put in one ventilator, I was asked for five more by the inmates of five different rooms. The landlady of the house herself joined in the application. I had four other orders for ventilators to give during the same day. I have taken clergymen and other gentlemen desirous to carry out the plans of ventilation over the houses, into some of the rooms of which ventilators had been introduced; we could always tell by the state of the air immediately we entered a room whether a ventilator was in operation. I have had dispensary patients who paid for ventilators themselves.

Were there no complaints at any time of the cold from the air through the ventilator in the windows?——In some instances there were complaints from cold, in which instances I had erred in placing too large ventilators in rooms that were very small. I find that it requires some experience to judge of the proper size and situation of a ventilator for a room, its position in relation to the bed, &c. A room with a smoky chimney requires a larger ventilator. I have very often succeeded in curing the smoke, and have been applied to by patients to cure their chimneys.

An instance is stated of the scrofula having broken out at the Norwood School in 1832. There were then 600 pupils there, amongst whom scrofula had broken out extensively, and great mortality had occurred, which was ascribed to bad and insufficient food. The case was investigated by Dr. Arnott; the food was proved to be most abundant and good; and defective ventilation, and consequent atmospheric impurity, was assigned as the cause. Ventilation was applied by his direction, the scrofula soon after disappeared, and 1100 children are now maintained in good health, where the 600, before ventilation, were scrofulous and sickly. More recently, in some information given to Dr. Lyon Playfair by Mr. Fleming, surgeon, the latter gentleman mentions the following case, which arose on the inspection of the state of schools with respect to ventilation, which he almost everywhere found to be extremely defective:—

"On inspecting the Blue-coat boys at Manchester School, I observed a "cutaneous eruption on the hands and arms; and I have seen it since "on the bodies of some of the boys. Three whom I examined looked "delicate, and appeared to suffer from indigestion. On inquiry I found "that this disease (I should call it scurvy) had prevailed some time "ago to a more alarming extent, and that it was comparatively sub-"dued. The first relief they obtained was from a change in diet, giving "a portion of meat every day with beer, and more potatoes and less "bread.

"I desired to be shown into the dormitories, where I saw large aper-"tures had recently been made in the side walls near the ceiling.

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"I was informed that the object had been to improve the ventilation, "and that they had to a great extent answered the purpose. Upon com-"paring dates, it seemed clear that the disease to which I have alluded, "though relieved by change in diet, assumed a much milder form from "the time of the alterations in the dormitories, and is now almost over-"come."

Have you, in the course of your own observations, met with similar collective cases?——I have met with one case strikingly similar. A charity school in London contained 60 boys and 60 girls, the ages of whom were from 9 to 14 years. These children, together with their attendants, lived in an old and large house, the girls and female attendants sleeping on the second floor, and the boys on the attic floor. All the boys slept in one large room, having windows on each of two sides, and each boy had a separate bed. Scrofula in a greater or less degree always existed amongst these children. In the year 1825, a project which for a long time had been entertained was carried out, viz., the erection of a separate house for the boys, which consisted of five stories, each story consisting of one large and lofty room. The basement was the dining-room; the ground floor the school; first floor, wash and store-room; second and third floors being sleeping-rooms; by this arrangement the 60 boys were divided, and 30 slept in each of the two rooms which were large, well ventilated, and lofty. With this change in their sleeping apartments, &c., the boys took much more exercise in the open air. The result was, that in a short time scrofula entirely disappeared from among the boys. Although the 60 girls, by the removal of the boys, gained a great deal of additional room, and although they walked out twice a-week, yet among them (at the very period that the boys were getting well) scrofula was so prevalent that the attendance of the consulting physician and surgeon was required in addition to the ordinary medical officer. The boys and girls were from the same class of the poor, and from the same localities; their food was quite alike. The girls did much laborious work as well as needle-work; the boys did the domestic work of their own house, and were also employed in tailoring.

Have your duties at the dispensary brought before you in numbers the complaints of any particular class of artisans?——Yes, of tailors particularly, and other sedentary classes.

To what extent do you believe their health to be affected by defective ventilation?——To a very great extent. One great cause of the diseases which they suffer is from defective ventilation and its results. This class of artisans, who work together in numbers, suffer from a variety of scrofulous and gouty affections. The scrofulous affections appear to me to be the immediate effects of the want of ventilation; the diseases of a gouty character are the secondary effects.

Will you describe the way in which you believe that these

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secondary diseases are produced?——I find that the great majority of my patients confess, upon inquiry, that they are led to indulge in spirituous and malt liquors to relieve the extreme physical and mental depression produced during their occupations; and I have no hesitation in ascribing the diseases of a gouty character, which are extremely numerous and variable, to the indulgence in spirituous and fermented liquors. I may add, that I have found those who worked singly, even in their own rooms, small as they may be, and surrounded by their families, to be in better health, or rather not to suffer so much as those artisans of the same class working in numbers.

From what you have observed, do you entertain any doubt of the expediency of a compulsory provision of the means of ventilation in new houses, especially for those intended for the labouring classes, or to edifices occupied as school-rooms, or as work-rooms, or places of public assemblage, such provision being to be made to the satisfaction of an officer competent to direct and judge of the appropriate means of ventilation?——None whatever.

Do you think that the exercise of a similar authority for providing ventilation to existing tenements would, if proceeded with properly, and duly explained, and the whole of the outlay not required immediately, be acquiesced in by the landlords, and received generally in the same grateful and satisfactory manner which you have experienced from the labouring classes?——I have no doubt of the expediency and the benefits derivable from such a provision.

Supposing a complete ventilation effected in the upper portion of any of such houses as those you visit, but cesspools still allowed to remain on the ground floor and give off their exhalations, though those exhalations might be diluted and rendered less noxious; from the observations you have made on the tenements now ventilated, have you any reason to doubt that the cesspools would still, to some extent, impair the general health of the inhabitants?——I have no doubt of it; indeed that is one of the sources of which it is absolutely necessary to remove before there can be any effectual cure. Some of the cesspools are in the cellars, and give out their exhalations from thence; others are in a yard, close to the door, which door is always open on account of the want of windows in the passage. When I have proposed to ventilate some of the rooms by means of the window ventilation, the occupants have made the well-founded objection, "We are afraid of any opening in the window on account of the bad smells which come up from the yard." I perceived at once that fixing the ventilator in the window would only have been the means of intruducing this noxious air. When I have proposed to fix a ventilator in the door of the room, a similar objection has sometimes been made: "The bad smells from the privy and the drain will only get into the room by hat way." "The smells from the passage are often worse than

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those in our own rooms." One poor woman, labouring under extreme debility, and who attributed her illness to the bad smells in the place, told me to-day that she could not go out of her room (a kitchen cellar) without feeling sick from the smells arising from the cesspool, and that it would make her still worse if any opening were made in the window. In places which are not overcrowded, and which do not need ventilation so urgently, I have had cases of debility, headache, pains in the head, and general depression, which were attributed, and were correctly attributable, to the bad odours arising from the cesspools. The patients continually complain of these smells. It is a common expression amongst them, "We owe some rent, but as soon as we can pay it we shall get away from this place, on account of the bad smells from the cesspool." The strong bear these stenches; but they take beer, which they consider necessary to counteract their effects.

Then your own observations lead you to coincide in the conclusion that there cannot be a healthy population living over or amidst the emanations from cesspools?——Exactly so; I find the people themselves are now becoming aware of the noxious effects of these smells, which now form a subject of discussion amongst them.

You have mentioned that, in visiting this class of the population, you find the want of personal cleanliness one collateral cause of disease?——Decidedly so.

Has the action of want of cleanliness as a cause been shown by the effect of cleanliness in abating it or removing it?——Yes; in the cases of porrigo or scald head in the children, and some inflammations of the eyes—very common disorders amongst them—which I have removed mainly by the strict enforcement of cleanliness and general ablutions. I believe that a variety of diseases, such as affections of the chest, rheumatism—which are not generally considered to have any connexion with personal cleanliness—are greatly aggravated by the neglect of it.

How far, in such places, does this want of personal cleanliness appear to be influenced or governed by the nature of the supply of water, its quality, whether it be accessible, or has to be fetched inconvenient distances, or otherwise?——It was only this morning that a patient stated that she could not drink the water that was supplied to the house, it being "full of insects." Patients have said that they only drink water when they cannot get beer. They have complained to me that they are often compelled to go to a distance to fetch water, because the water supplied to the house is so bad.

Have you observed how far the impurity of the water may have arisen from neglect to cleanse the water-butts?——I have observed that the water-butts do not look very proper receptacles, being made of wood, from which the paint has decayed, and the wood itself

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looking decayed, no cover on the top, and a film of blacks and dust on the surface of the water.

The water is generally laid on in the yard or the lowest part of the premises, and a supply is generally given three times a-week, and at each time the water comes on the film of dust and blacks that has been deposited on the surface is mixed up with the previous accumulations. Even in a more open and less sooty and dirty neighbourhood, as on the surface of the Water Company's reservoir, in the Green Park, the deposit of soot, or dust or dirt may be at times observed as a dark scum or carpet spread over it. One patient complained very much of the quality of the water taken from an old wooden butt. In respect to it I learned that this same water is used for making bread by a baker who supplies a great number of the poor. Since attention was directed to the subject by the Sanatory Report, I have availed myself of opportunies of making observations upon it, and the result is, the strong conviction that the quality of the supplies of water, and the mode in which it is received and kept in such atmospheres, influences the diet and health of the population to a much more serious extent than has hitherto been imagined.

As to the state of the household economy, have you observed any effects apparent from water not being conveniently accessible or laid on in the rooms which form separate tenements?——I have observed the same water, which is very filthy from having been used in washing some clothes, used again to wash others. They have told me, indeed, that they have done this to avoid the inconvenience of fetching water from a distance, and from the inability to carry the water up stairs when the rooms inhabited have been on the upper floor. My informants on this topic, it should be remembered, are patients, sickly people, weakened by sickness, and who cannot afford to pay for attendance. To the mothers who are debilitated, the carrying water up stairs is a very great exertion; mothers not daring to leave a child in the room, have to carry the child in one arm and the vessel of water with the other. I have had even sick children neglected and left dirty, and the excuse given has been the inability to fetch the water. Recently I have had a case of this kind. I have attended three children, two of them with scrofulous inflammations of the eyes, the other of them with a scrofulous affection of the throat; all of them rarely washed, and in an extremely filthy condition. The mother is a poor woman, who has been in a respectable condition, but she is now so far advanced in pregnancy as to be incapacitated from going up and down stairs to fetch water. She continually deplores her condition of having neither the strength to fetch a sufficient supply of water nor the means of paying for it being brought to her.

In these cases water is laid on in outer yards?——Yes; in

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outer yards principally. A considerable obstruction to the proper cleanliness arises, not only from the inability to bring fresh water up, but from the inconvenience and inability, arising from the want of proper sinks, to take dirty water down stairs. One source of dampness and smell I have frequently found is the vessels of dirty water retained in the room. The common excuse for this retention is, "We are so knocked up with the day's work that the water must wait until to-morrow, when we shall be able to remove it." In some cases of accident to the female which I have had, such as of sprained ancles, or bad ulcers on the legs, which confine her to the bed, there has frequently been no water whatever in the room; and after dressing and bandaging the patient I have been obliged to try and get water in the next rooms; sometimes there has been none in the next rooms; at other times that which the other occupants have had has been so dirty as to be unfit for use; sometimes I have waited whilst water has been sent for, for me specially, and sometimes I have been obliged to go away with my hands unwashed, and to take the chance of my finding water at a neighbouring patient's. The towels given me to wipe my hands with, although ostensibly clean, yet having evidently been washed in dirty water, are unfit for use. I frequently find that the water brought and kept standing in these crowded and close rooms retains dust and other impurities: it no doubt absorbs some of the noxious gas, for it differs considerably from the state in which it is when first obtained. The taste of water obtained from the common Companies' supplies I have found to be very different from that in which it was first obtained —very peculiar and very unpleasant. I have observed that the people use a very small quantity of water in cooking; that, to save water, they put greens into the pot without washing them, and to save having to fetch more water.

Then the tall houses, let off into separate rooms or flats, such as you describe, are in a worse condition than low separate cottage tenements in a row, without drainage or water laid on them, the labour of carrying water up or down two, three, or four stories high being so much greater?——Certainly; and this has a very great effect on their economy, their habits, and their health. I have frequently remarked that the condition of the whole of this population has descended with the condition of the habitation. I have indeed myself known respectable and cleanly people who have for some time struggled against the degrading influences by which they were surrounded, who have ultimately become personally dirty and careless, and have had their moral feelings evidently in some degree lowered. I beg to state, however, that I frequently have occasion to admire the admirable spirit with which the poor bear up against the dreadful disadvantages under which they labour. When I see the working man and his wife

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living in a dark damp kitchen, or in a close attic, supplied with a deficient quantity of impure water, the odour throughout the house being most offensive,—paying for this accommodation an exorbitant rent, I must confess that the wonder to me is, not that so many of the labouring classes crowd to the gin-shops, but that so many are to be found struggling to make their wretched abodes a home for their family.

It is stated, on the evidence of persons actually engaged in the occupation, that the expense of cleansing a cesspool is in the metropolis about 1*l.* per annum, and that it constitutes a charge of 4½*d.* per week upon each tenement. It is also proved that if the system of keeping on water constantly at high pressure be adopted, that the use of water-butts and water-tanks may be entirely dispensed with, and water may be distributed into every room of such a house fresh from the general reservoir or filter, at an expense not exceeding 1½*d.* per week; that for the cesspool a cleansing apparatus or soil-pan, with water of the nature of a water-closet, and the requisite drains, may be substituted, at an expense of not more than 1½*d.* per week, and all refuse be instantly removed in water through impermeable pipes, so that the foundation of the house need not be saturated with decomposing matter, and none need to remain on the premises to give off effluvia: according to your own experience and evidence it would appear that the whole of an existing tenement may be ventilated completely at an expense which need not incur an addition of more than one halfpenny per week to the rental; now, supposing these several desiderata accomplished, the cesspools removed, abundant supplies of pure water carried up to the tops of the houses to every floor, and if required into every room, and ventilation made effectual, can you form any opinion as to the extent to which sickness and mortality might be reduced by these several arrangements? ——It is difficult to form an estimate, but I feel confident of a reduction of one-third immediately. It is my opinion that the diseases which are produced secondarily, and which have hitherto been supposed to have no connection with the causes specified, would be influenced or prevented to a very great extent—the habit of drinking, stimulated, if not produced, by nervous depression, would be abated—the diseases, which are rendered more fatal and are modified by the habit, would be diminished. From what I have seen I am disposed to expect that very beneficial effects would arise from the depressing influences on the general spirits, the relief from the depression giving greater spirit and energy to them. I am disposed to believe, on a careful consideration of all the effects producible by such alterations, that a reduction of one-half the existing amount of sickness and mortality might be produced by them. I can corroborate by my own observations of particular cases within the sphere of the charity, that the excessive mortality arising from the depressing causes specified

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does not diminish the numbers of the population, and that it only produces a weaker and more wretched population. I find that the worse the condition of the people the earlier are they married, and the greater the mortality amongst the children the more rapid the births. Amongst the scrofulous and even the consumptive patients whom I have attended are remarkably numerous families. I have seen reason to believe that the existence of scrofulous disease is often a cause of sexual irritability; even at the latter stages of scrofulous disease I have observed peculiar irritability of that description. I have observed not unfrequently in cases of consumption of males a particular anxiety for marriage, even within a period of four or five weeks of their deaths. I can also, from my own observations within the district of my visits, corroborate the facts already laid before the public of the demoralizing effects of continued deaths in the absence of affectionate feeling and selfishness with which these events are ultimately treated.

If an increased rental were requisite for these improvements, instead of there being generally reductions of existing charges, and if they were to fall as new charges upon occupants, such as those whom you have alluded to, do you believe they would defray them cheerfully ?——I have no doubt of it. Having been informed of the practicability of laying on pure pure water constantly at a penny a-week. I have asked a great number of the patients whether they would consent to pay an additional rent of 2*d.* a-week to have the water laid on in their rooms, and they have expressed warmly their willingness to pay even more; that such payment would be but a trifle for such a "blessing," as they have termed it. They have not complained, because they never imagined the practicability of any amendment.

Have you taken notes of the cases which you visit ?——I have done so, and I enter the information in a tabular form. The following are the first 100 cases which I entered. In them I find a greater frequency of deaths in the families, and a greater mortality among families, which I consider to be the result of the earlier marriages. From the amount of wages obtained in some of the cases it may be conceived that there was no want of proper food; and from my own observation some of the worst cases of scrofula occurred in families who were provided with sufficient food and efficient clothing. From such experience I have been led to entertain views similar to those stated by Mr. Baudelocque as to the origin of scrofula. The rich, amongst whom scrofula and the strumous diathesis prevail to a very great extent, will be found to have been in the habit of living and sleeping in close and ill-ventilated rooms. Boys of the higher classes, when they go to schools and live with numbers, then manifest symptoms of scrofula which have never been seen before. I have known children cured of scrofulous eruptions by the removal of close curtains and confined cots.

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The following appears to be a summary of the average ages of death amongst the chief classes of the district of St. George's, Hanover-square, during the year 1839, which appears to have been not an unusually unhealthy year:—

District.	Class.	Deaths of each Class.		Proportion per Cent. of Deaths of Children under 10 to total Deaths.	Proportion per Cent. of Epidemics to Total Deaths.	Average Age at Death of all who die above 21.	Average Age at Death, including Children.	Year's Average premature loss of Life by		Proportionate Number of Deaths to Population.	Excess in Number of Deaths above a Healthy Standard.
		Total.	Adults.					Deaths above Age of 21.	Deaths of all classes		
St. George, Hanover-square. Population 66,433.	Gentry. .	138	110	2·1	·9	59	45	2	..	1 in 50	272
	Tradesmen	191	112	6·	1·7	50	29	12	10		
	Artisans, &c.	872	528	26·	9·8	47	27	15	12		
	Undescribed	35	18	1·3	·2	61	32	1	7		
	Paupers .	89	77	·9	·6	59	51	3	..		
	Totals and	1,325	845	36·2	13·3	..	..	..	..	..	..
	Averages .	..	..	..	..	50	31	12	8	..	..
		No. of Births 1·260			Age of Living 28·3			Births 1 in 53.			

The summary of the returns you have collected as to the condition of the first 100 families visited by you, of whose condition you were enabled to obtain the facts entered under the several heads, appears to be as follows?—

Average Age of the Heads of Families.		No. of Children living.	Average to each Family.	Average Age of Children living at once.	No. of Individuals sick.	No. of Children dead.	Average to each Family.	Average Age at Marriage. Males.	
								Earliest, 16 to 30.	Latest, 30 to 45.
Male. 39·6	Fem. 37·7	353	3, & 53 remaining.	10·1	212	253	2, & 53 remaining.	Average. 23	Average. 36
38·6								25	

Average Age at Marriage. Females.		Average Wages per Family.		Average Number Sleeping in a Room.		Price of Lodgings.	
Earliest, 16 to 30.	Latest, 30 to 45.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.
Average. 21	Average. 32	30*s.*	4*s.*	9	1	11*s.* 6*d.*	1*s.* 6*d.*
21		19·9		Nearly 5.		Average 4*s.*	

From this summary it appears that the mean age of the living adults or heads of families is at the least six years lower than the

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average age of the living adults of an agricultural population. Those whom you visited would be of the least healthy; but supposing they have the chances of life of the whole of the class of artisans living within the district, the insurable span of existence before them would appear, from the preceding returns of the actual expense, to be restricted to eight years and a half instead of upwards of 20, attained from the same age by better conditioned classes, living in better conditioned tenements in the same districts, or than agricultural labourers living in purer atmospheres in other districts, and in receipt of a less amount of wages even than those families receive who are applicants for the charity which you dispense?——Yes; and it is proper to direct attention to the pecuniary pressure of the excessive sickness and mortality which render the families really objects of charity, notwithstanding the wages they receive. Amongst the families will be found the family of a policeman whom I attended. When he applied for relief the observation which occurred was, "You have, as a policeman, 20*s.* a-week regular wages, and other advantages; you are never out of work, and cannot be considered a proper object of relief from the funds of a dispensary intended for the poorest class?" His reply was, that he paid for his miserable one room, divided into two, 5*s.* a-week; that he had 1*s.* 8*d.* weekly to pay for keeping up his clothes, which reduced the money he had for his family of four children and his wife to 13*s.* 4*d.*; that he had had all his children ill, and lost two; that he had during three years paid six doctors' bills, principally for medicine, at the rate of 2*s.* 6*d.* a bottle, amounting to between 30*l.* and 40*l.*; that two of the children had died, the funerals of which, performed in the cheapest manner he could get it done, had cost him 7*l.*; the wife and his four children were now ill." They were so depressed and debilitated as to render them very great objects for the Dispensary and the Samaritan Fund. All this misery was traceable to preventible causes. Take another case in the list before me. A porter, in regular employment, at wages producing 1*l.* a-week; he paid 3*s.* 6*d.* for a most miserable and unwholesome room, in which himself and six other people, four children and three adults, slept; the children were shoeless, extremely filthy, and badly clad; the wife ill in bed of a diseased knee, for which I attended her; two children had been still-born, and he had lost three others; the sickness of one of these children, which had died at 14, of consumption, had cost him in doctors' bills 16 guineas; the sickness of the one which died 11 months old, of water on the brain, had cost him 6*l.*; the third had died 14 days old. The expenses in the three cases had so impoverished him that he was compelled to apply to the parish for aid for their burial. I will submit a third case; that of a cook, in receipt of 25*s.* per week regular wages. He was living with his

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wife and three children in a small, close, ill-conditioned room, for which he paid 5*s*. per week rent; he complained that the water was always "thick," and very disagreeable to the taste, and the smells from the sewers and the drains in the house were very bad; he had five children, of whom two had died; that he had paid doctors' bills for his wife's confinements, 5*l*. each; and for one child, which died of scarlet fever, at four years of age, the doctor's bill was 4*l*. 18*s*.; for the one which died of debility at the age of 10 weeks cost him 1*l*. 10*s*.; the funeral of the eldest child cost him 3*l*.; and the one at 10 weeks 1*l*. 10*s*.; he showed that the expenses of confinements, the doctors' bills, and the undertakers' bills, and the illness of his wife, arising from five miscarriages, had so impoverished him, that having now two children ill with scrofula, he was obliged, though reluctantly, to apply to the dispensary for relief. The last case I will submit to the Commissioners is that of a shoemaker, a good workman, who earns 20*s*. a-week: he pays 5*s*. a-week for one small miserable room, in a narrow court; he has had seven children, of whom he has lost five, for which he has paid in doctors' bills between 2*l*. and 3*l*. each; the expense of his wife's confinements amounted to 3*l*. 15*s*. each; the expenses of the funerals of the five children were between 3*l*. and 4*l*. each; his wife's age was 32, his own age 37, and at this age of 37 he continually suffered from nervous depression, and having one of his two other children with a lingering disease, a scrofulous affection of the hip, he was compelled to come to the dispensary; he complained that the water of the house was never clear, and never sweet. A man in receipt of 30*s*. per week's wages, considering his amount of rent, which was 5*s*. 6*d*. for one room, for himself, wife, and three children; having had four deaths after lingering consumptions, and a wife and children never well, I felt that he also was a proper object of the charity. At the time I visited these 100 families, no less than 212 of the members were suffering under disease, manifest in various stages; they had already had no less than 251 deaths and funerals, and a corresponding amount of sickness. It was only in a late stage of my investigations that I began to see the very serious amount of miscarriages they have had, and which in many instances exceed the deaths. Three hundred and fifty of the members of these 100 families were dependent children, whose average age was little more than 10 years.

WILLIAM AUGUSTUS GUY, M.D., examined.

W. A. Guy, M.D. ARE you professor of forensic medicine at King's College, and one of the physicians attached to the King's College hospital?——Yes.

Have you given much attention to the influence of employments upon health?——I have.

In what way have you prosecuted your inquiries?——In two ways.

1st. By carefully entering the sex, age, and occupation of several thousands of adults, presenting themselves as out-patients of King's College hospital, throwing the occupations into classes, and contrasting the results with the mortuary registers for 1838, 1839;—and,

2nd. By a personal inspection of the workshops of the metropolis.

State the results of the first of these inquiries?——They are briefly these:—

1st. Consumption is relatively more frequent in persons working in-doors than in those employed out of doors.

2nd. In those employed within doors, it is most frequent in men using little exertion.

3rd. It makes its attack earlier where it is of most frequent occurrence.

4th. It is very common in the intemperate, and in those exposed to the inhalation of dust.

5th. It is more frequent in men than women, at least in the metropolis.

Have you extended your inquiries so as to embrace other classes of society, as well as working men, and if so, what are the results of those inquiries?——Yes, to the gentry and tradesmen, using for this purpose the mortuary registers for 1838 and 1839. The results are these:—

1st. The proportion of consumptive case in the three classes of gentlemen (including professional men), tradesmen, and artisans, (including all classes of labouring men), are respectively 1 to 5, 1 to 2·60, and 1 to 2·29; or about 16, 28, and 30 respectively in the hundred.

2nd. The average age of death from consumption is earlier in the last two classes than in the first; but the artisan who dies of consumption dies at a somewhat later age than the tradesman.

The tradesmen of the metropolis, then, are nearly twice as liable to consumption as the gentry?——Yes.

How do you account for this great mortality from consumption among the class of tradesmen?——I think that it is mainly attributable to their confinement during so many hours of every day in ill-ventilated shops.

W. A. Guy, M.D. This observation of course applies equally to the class of shopmen?——Precisely so.

Do you attribute the cases of consumption, which are so numerous among tradesmen and shopmen, entirely to the state of the shops? Is it not partly due to the rooms they live in?——Not more in the case of shopmen than in that of other persons of similar condition of life. But I think that the tradesmen of London, as a class, including the petty tradesmen, are generally very badly housed. They give up to their business almost all the space they can command, and let the upper part of their houses to lodgers, living themselves in small back rooms connected with their shops, which rooms are often not larger or better ventilated than those of the poor. This leads to much sickness among them. It is only within a very few days that a London tradesman gave me this account of himself. He had been originally a workman, and having saved a little money, opened a small shop in a back street. For some years he slept in a small close back room behind his shop; and during the whole time was subject to frequent attacks of cold, with affection of the chest. These attacks were often so severe as to require medical advice and attendance for weeks together. He has since moved into an open airy situation, with ample accommodation for himself and family, and he is not only very rarely subject to colds, but these, when they do occur, are readily cured by the most simple means. He states that he saves in this way a large sum previously spent in medicine.

Then the tradesmen of London, as a class, not merely live in small and confined rooms, but are employed throughout the day in heated and close shops?——Yes, most of the shops of London are very hot and close, especially during the evenings, when the gas is burning. Many tradesmen are conscious that their health suffers from it; and those who do not think of that, complain much of the injury done to their goods. The moisture and foul air arising from the gas are extremely injurious to a great number of articles sold by tradesmen, and the want of ventilation in shop fronts is much complained of.

You have stated that though there are relatively more cases of consumption among the artisans of the metropolis, nevertheless the tradesmen who die of that disease are cut off at an earlier age. How do you explain this?——The class which I have designated as artisans includes the whole body of labouring men, of whom a large proportion either use strong exertion within doors, or are employed out of doors; and I have ascertained that the consumptive patients of both classes live longer than men following sedentary occupations within doors, and longer than the class of tradesmen. It is this which gives to the entire class of working men this slight advantage over the tradesmen of the metropolis. This is shown in the following comparison:—

Deaths from consumption under 30:—in-door, 37½ per cent.; tradesmen, 33 per cent.; out-door labourers, 25 per cent. W. A. Guy, M.D.

In-door and sedentary, 44 per cent.; tradesmen, 33 per cent.; in-door, using great exertion, 31½ per cent.

The deaths under 40 in the three classes have nearly the same relation to each other as those under 30. In other words, the tradesmen of the metropolis hold an intermediate place between those who work out of doors and those who work in-doors; and between those who use little and those who use much exertion in their in-door occupations.

Do we understand you to assert that men who follow their employments out of doors, though exposed to all the inclemencies of the weather, are less subject to consumption, and that when they die of it, they die at a later age than men who work in-doors, and are protected from the weather?——Yes. Both men and women who follow their employments out of doors, possess this advantage; and it is not the labourer only who is comparatively exempt, but even the hawker who stands about in the streets and markets, and who probably uses little more exertion than the majority of those who work within doors. It is not therefore to exercise, but to the open air that they owe this advantage.

You state that you attribute the great liability of tradesmen to consumption, as compared with the class of gentry, to their confinement during so many hours every day to ill ventilated shops. Do you assign the same cause for the great number of consumptive cases which you state to occur among men employed in-doors as compared with those who work in the open air?——Yes. I believe that the same cause is at work in both cases. Both classes breathe a foul and heated atmosphere. I would support this view of the case by a very simple argument:—the in-door labourers, as a class, (I speak now of men,) have higher wages, and can consequently command better food, clothing, and lodging, than those who work out of doors. In this respect then they are more favourably circumstanced. Their habits of life, too, are nearly the same, and it is probable, (at least I have been led to form that opinion,) that the out-door labourers, as a class, are more addicted to intemperance. There are only two things, then, in which the two classes differ. A considerable proportion of those employed within doors lead a sedentary life, and the whole of them breathe an air less pure than the out-door labourers. Now it is an acknowledged fact, that among literary and professional men, sedentary pursuits do not shorten life. Hence there remains but one cause to which to attribute the greater liability of the in-door labourer to consumption.

He is not only more liable to consumption, but he dies earlier. Do we understand you to say so?——Yes. Not only are many lives lost which might be saved, but those who die are cut off prematurely.

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Do you mean by the term consumption, consumption of the lungs, the disease called by medical men tubercular consumption, and phthisis pulmonalis?——I mean consumption of the lungs.

You have stated that men are much more subject to this disease than women?——Yes. In the metropolis, and probably in large towns, the deaths from consumption in men are more numerous than in women. I should state that there are about five deaths in men for four in women.

Do you consider this disparity as a confirmation of the view which you take of the cause of consumption?——I regard it as a very strong confirmation. I believe that in the metropolis, the number of females who work in their own rooms bears a much larger proportion to those who are engaged in workshops than in the case of men; and I find that men who work in their own rooms are less subject to consumption than those who work in company with many others in crowded workshops.

You think, then, that the apartments of the poor are more wholesome than their places of work?——Without doubt. The air of the poor man's apartment, small and mean as it is, is much more wholesome than that of the greater part of the workshops of London, and I should say, than the shops of the metropolis.

Have you turned your attention to the health of milliners and dress-makers, who are employed in workshops?——Not especially. They have been classed with those following sedentary occupations, and the results for this entire class agree with the results obtained in the case of men.

It is your opinion, then, that both in males and females, there is a greater liability to consumption among those who work in-doors?——I am decidedly of that opinion. The facts all point to that result; and in this respect my own inquiries strongly confirm those which have been made by others.

And this greater liability to consumption you attribute to the want of proper ventilation?——Yes.

Have you found that a stooping or constrained posture exercises much influence in promoting pulmonary consumption?——I believe very little indeed; and my opinion is founded upon pretty accurate comparisons. Compared with the cause which I have pointed out, it is as nothing.

Have you been able to institute any exact comparisons between men breathing the same air, but using different degrees of exertion?——Yes; I have made very precise comparisons between the pressmen and the compositors, of whom the former use strong exertion in their employment, while the latter make many small movements of the hands and arms. Their rooms are generally warmed and lighted in the same way, and they both have but little space to work in, though the pressman requires more room. The comparison is greatly to the disadvantage of the compositor, who is extremely liable to consumption, and at a comparatively early period of life. This is the more striking, as the pressman is notoriously more given to habits of intoxication than the compositor.

Sedentary occupations, then, as compared with those requiring stronger exertion, are decidedly injurious to health?——Certainly, very much so.

Are not men who use strong exertion liable to some diseases from which the more sedentary occupations are free?——Yes; but they occur later in life, and in smaller numbers. Towards 50 years of age, men who labour hard begin to suffer from hard work, and they become very liable to diseases of the air-passages of the lungs, and to some diseases of the heart. The fact which I now state accounts for the greater number of very old men found among those following sedentary occupations. The few that can bear the unwholesome influences to which they are exposed, having reached that time of life when hard labour is injurious, still continue to enjoy the health of which such hard labour deprives other men.

Do you attribute all the cases of consumption, which are not the result of strong hereditary tendency, or which may be said to be natural to the human body, under even the most favourable circumstances, to deficient ventilation?——No. This I believe to be more fatal than all other causes put together; but habits of intemperance hold the next rank, and after them every cause which tends to debilitate the frame. Thus consumption is very frequent among the dissipated of both sexes.

The number of deaths from consumption occurring every year in England and Wales, according to the returns of the Registrar-General, amounts to nearly 60,000, are these all cases of pulmonary consumption?——No. I have reason to believe that about 36,000 are cases of true pulmonary consumption.

This is the result of a calculation of your own?——Yes. It is the best estimate I could form.

Of these 36,000 deaths from pulmonary consumption, how many, do you think, might be saved by proper sanatory measures?——According to a very careful calculation, founded upon the number of deaths from consumption occurring in the different classes, I have been led to estimate the possible annual saving of adults in the whole of England and Wales at little less than 5000.

And at what number for the metropolis?——About half that number.

What proportion of these unnecessary deaths are you inclined to attribute to the deficient ventilation of workshops?——About one-sixth of the whole number.

Then you attribute the remainder to the condition of the dwellings of the poor?——Yes, and principally to deficient ventilation.

W. A. Guy, M.D. Does this estimate include the probable sacrifice of life among tradesmen?——No. Merely that which I suppose to occur among the labouring classes.

Then your estimate is rather below than above the probable number?——I firmly believe that my estimate is rather under than above the truth. It indeed assumes, what is not likely to be the case, that the waste of life occurs only in the metropolis and in about 20 of the largest towns of England, and that there is no waste of human life from this cause in the rest of the country.

There is an opinion abroad that consumption is a national disease; that it is more prevalent in England than in other countries—does this opinion seem to you to be well founded?——No; I believe it to be a vulgar prejudice; it is altogether unsupported by facts: but, as we have at present no means of comparing one country with another in this respect, it is not possible to prove its fallacy. The opinion, whether true or false, has exercised a very injurious influence upon the public health—it has turned men aside from an inquiry into the removable causes of consumption, and led them to regard the disease as a sad necessity beyond the reach of prevention. Englishmen, generally, seem to take a sort of pride in making themselves out worse than they are. Not long since we believed ourselves to be the most suicidal nation in the world, and we were not easily convinced to the contrary. We are always croaking about something or other, and our extraordinary liability to consumption is a favourite topic with us. If we are more liable to it than other nations, I am convinced that it is because we have a larger proportion of our population engaged in manufactures, of whom a considerable number lead sedentary lives, and suffer from overcrowding and overwork, joined, in many cases, to habits of intemperance unknown abroad.

You are, then, of opinion, that there is nothing in the climate of England, or in the constitutions of Englishmen, which predisposes them to consumption in a greater degree than the natives of other countries?——I am; but I speak of the European nations only.

You have now stated the principal results of your inquiries, based upon your hospital experience and the mortuary registers. Does your personal inspection of the workshops of the metropolis confirm these results?——As far as my inquiries have extended, completely. I have found the ventilation of workshops very imperfect, even where the building was expressly designed for the purpose to which it is applied. As far as I have had an opportunity of observing, the history of a London workshop is this:—A man begins by employing a few hands in a house often but ill adapted for an ordinary dwelling-house, and as his business increases, he contrives to add one low apartment to another by knocking

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down partition walls and making such slight alterations as suit his immediate purpose. He contrives by this means to accommodate an increasing number of men, and the only practicable limit to that number is the want of mere standing or sitting room, as the case may be. He warms these rooms by a stove, by steam, or by hot air, and lights them with gas. The consequence is, that the workmen are exposed at the same time to a high temperature and a foul and stagnant atmosphere. This combination is carried to its highest degree in the tailors' workshops; and I have been told more than once, by the journeymen tailors themselves, that they have been obliged to strip to the very skin that they might be able to bear the intense heat to which they are exposed. In buildings intended for workshops more space is given to the men, but they are usually constructed on very bad principles. The whole building often forms one space, divided by floors perforated by a common staircase. If a steam-engine is employed it is generally to be found in the lower compartment of this building, so that the heat rises from this into the upper rooms, and mingling with the foul air of the intermediate floors, ascends to the highest flat, where the hot and foul air collects in great abundance. Such a building as this once gave me the opportunity of a very striking comparison; 15 men were employed on the second floor, and 17 men in precisely the same way on the third and uppermost floor. On making personal inquiries of each of the men respecting his health, four only out of the 15 on the second floor made any complaint; one was subject to indigestion, a second to cough, the the third to ulcers of the leg, and the fourth was what might be termed a valetudinarian. But of the 17 employed on the uppermost floor, three had had spitting of blood, two were subject to affections of the lungs, and five to constant and severe colds. Ten of these 17, therefore, were subject to diseases affecting the chest, while one only of the 15 in the room beneath had a disease of this nature. The men themselves, who had been for a long time in the employment of the same master, were fully alive to the injury which they sustained, and had made frequent representations to their employer. Some unsuccessful attempts had been made to remedy a state of things mainly dependent upon the faulty construction of the building.

It is not a little remarkable that another workshop of the same kind, and constructed in the same faulty manner, gave a similar result: of 20 men in the upper room, two had had spitting of blood, two indigestion, two rheumatism, one was subject to headache, one had varicose veins, and two were subject to lowness of spirits (hypochondriasis); making in all 10 invalids in 20, being exactly half the number. On the contrary, of 15 men employed in the lower room, one only had spit blood, one complained of weakness, and a third of indigestion, making three in all; being at the rate of 4 in 20, in the place of 10 in 20 in the upper room.

W. A. Guy, M.D. I may mention another striking fact of the same kind. In visiting workshops I have carefully noted the dimensions of the rooms, the mode of heating, the mode of lighting, the number of lights, and the number of men employed. I have also ascertained from each man whether or not he has been subject to any disease, and if so, of what disease. All these particulars having been very carefully noted down, I have had the means of forming some very exact comparisons. The following is one of them :—Forty men were employed in five rooms, containing an aggregate of 12,121 cubic feet of air, being at the rate of 303 cubic feet of air per man. These rooms are lighted every evening by 60 gas-lights. Other 40 men were employed in other five rooms, containing 31,549 cubic feet of air, being at the rate of 789 cubic feet per man, and these rooms were lighted in the evening by 75 gas-lights. All the 10 rooms were heated by stoves. Assuming that the gas-lights in the two sets of rooms produced an equal degree of impurity in the air during the time that they were burning, I have thought that the comparison between the two sets of rooms would become complete if I divided the quantity of air which they respectively contained by the number of lights burning during the evenings. The result of this division is as follows :—

First set of rooms, 303 cubic feet of air per man, giving, when divided by the number of lights, a quotient of 5·05.

Second set of rooms, 789 cubic feet of air per man, giving, when divided by the number of lights, a quotient of 10·52.

It results from either of these comparisons that the 40 men occupying the first five rooms had less than half the quantity of air to breathe which the 40 men in the five larger rooms had. In all other respects their situation was precisely the same. Now, of the 40 men occupying the smaller rooms, and consequently breathing a hotter and fouler air, five had had spitting of blood, six were subject to severe catarrh, six complained of indigestion, two of great debility, and one of rheumatism. On the other hand, of the 40 men occupying the larger rooms, and having a purer and cooler air to breathe, only one was subject to catarrh, two to indigestion, one to pain in the chest, one to nervous symptoms, one to headache, and one had varicose veins. Not one of them had spit blood. As a still further confirmation of the injurious effects attributed to impure air, I beg to subjoin the following table, founded upon a careful inquiry into the condition of the men as to health, and an accurate measurement of the rooms in which they were at work :—

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—	Spitting of Blood.	Catarrh.	Other Diseases.	Total.	Per Centage Proportion. Spitting of Blood.	Catarrh.	Other Diseases.	Total.
104 men having less than 500 cubic feet of air to breathe.	13	13	18	44	12·50	12·5	17·31	42·31
115 men having from 500 to 600 cubic feet of air to breathe.	5	4	23	32	4·35	3·48	20·00	27·82
101 men having more than 600 cubic feet of air to breathe.	4	2	18	24	3·96	1·98	17·82	23·76

How were the men employed in the rooms which you have thus compared?——They were all letter-press printers.

Have you visited the newspaper offices?——No. But I have reason to believe that they are still more unwholesome than the common printing offices.

Have you extended your inquiries to other workshops?——Not in the same strict manner; but I have visited several workshops of all kinds, and find them, as a general rule, very badly ventilated, and very unwholesome.

Does the appearance of the men who work in these unwholesome rooms correspond with the account which you have now given of their greater liability to attacks of sickness?——Yes, in most instances; but there are remarkable exceptions to this as to all general rules. Though it is very rare to meet with a stout or fresh-looking man in these rooms, they are occasionally met with; and although there are comparatively few old men among the workmen, there are one or two. I have met, for instance, with a man of 72, who had been employed for the greater part of his life in the same workshop, and that by no means the most wholesome which I have visited. He was in the enjoyment of the most perfect health.

But, as a general rule, these cases are to be regarded as exceptions?——Without doubt they are rare exceptions.

Are the men whom you have thus visited employed constantly in the same offices and in the same rooms, or do they change about?——By far the majority of the men continue to work for the same employer, and while they do so they generally occupy the same room and even the same place. When I have visited the same printing offices at intervals of some months I have recognized at once my old acquaintances in their old places. I have also seen several of them as patients at the hospital, and I have almost invariably found that they were working with the same employers as when I visited them.

You think, then, that the comparisons which you have just made are near approximations, and that the general results may be relied on?——I believe them to be very close approximations.

W. A. Guy, M.D. I do not think that they in any way exaggerate the baneful effect of hot and foul air.

You have stated that men who use strong exertion in their employments are less injuriously affected by the unwholesome state of their workshops than those who use little exercise, that they are less subject to pulmonary consumption. If this opinion be correct, it should follow that the average age of the former class is greater than that of the latter. Does your experience lead to this result?——It does. I have carefully compared the pressman and the compositor in this respect, and find that the average age of pressmen, who began to work at any given age, is higher than that of compositors beginning at the same age. I submit a table which proves this:—

Beginning their Employment at

	14 Years.				15 Years.			
		Age.				Age.		
	No. of Men.	Max.	Min.	Mean.	No. of Men.	Max.	Min.	Mean.
Pressmen . . .	14	55	19	33	18	60	19	36
Compositors . .	139	72	15	30	42	47	16	26

	16 years.				14, 15, an 16 Years.			
		Age.				Age.		
	No. of Men.	Max.	Min.	Mean.	No. of Men.	Max.	Min.	Mean.
Pressmen ; . .	13	55	20	33	45	60	19	34
Compositors . .	16	38	17	25	197	72	15	28

Do you find that the compositors are more liable to pulmonary consumption than the pressmen?——Decidedly so.

Exercise, then, in some degree counteracts the ill effects of impure air?——Yes, and for this reason it is better that people who are invited to breathe foul air in ball-rooms should dance than that they should sit still.

Is pulmonary consumption the only disease which you attribute to the defective ventilation of houses and places of work?——No. I consider the heated and impure atmosphere of workshops, and a similarly unwholesome state of the dwellings of the poor, as the cause of a large number of diseases—of scrofulous diseases in childhood, of inflammation of the lungs, of the febrile affections to which the children of the poor are so subject, and of those chronic disorders of the bowels which are so apt to terminate in mesenteric disease. A great proportion of the deaths of children entered in the Reports of the Registrar-General as consumption are of this nature, and chiefly due to this cause. In adults the effect of the depressing atmosphere of places of work such as those I have described extends much beyond the production of pulmonary consumption. Both the mind and the body are injured; the one is in a state to be excited by slight causes, and the other to require, or to seem to require, the aid of intoxicating liquors. Each ministers to the other's weakness, and each re-acts upon the other. W. A. Guy, M.D.

Are men employed within doors more addicted to habits of intemperance than those who work in the open air? Does the unwholesome state of the workshops, by producing the depressing effect you speak of, lead men to drink?——I believe that, as a general rule, men who work out of doors drink more than those employed within doors; they have more temptations; they are more in the way of it. But I believe that the unwholesome state of places of work, by the depressing effect it produces, is a great cause of intemperance. It can scarcely be otherwise.

In the course of your inquiries have you given any attention to the influence of habits of intemperance on health?——Yes. I have made an exact comparison between the classes most exposed to the temptation of drinking, and those who are not more intemperate than the greater part of the labouring class. I have compared, for instance, the drayman with the labourer, the potboy with the footman, and the licensed victualler with other tradesmen. All these comparisons are very unfavourable to the classes most exposed to the temptation of drinking. I find that, before 35 years of age, more than twice as many draymen die as labourers; and that before the same period the deaths among potboys exceed those of footmen by more than a third.

You state that men who work out of doors are more addicted to drinking than those who are employed within doors. How do you account for this?——There are many reasons for it. The man who has much exertion in the open air is not so conscious of the effects of spirituous liquors as the man who leads a sedentary life within doors, nor does his occupation require so much thought or so steady a hand as that of the artisan. Those who work hard, too, think that some kind of fermented liquor is absolutely necessary. Moreover, many labouring men are hired at public-houses, and must recommend themselves by spending their money freely in beer and spirits. The brewers' draymen, the potboys, and the porters at wine vaults, all have access to intoxicating liquors at all times, and are allowed a large quantity of liquor.

Does your experience of the poor lead you to believe that habits of intemperance are on the decrease among them?——Decidedly so. I have taken much pains to ascertain the point, and have no doubt that they are fast improving in this respect, the younger more than the older.

Have you observed that the working classes are alive to the injury which they sustain from the unwholesome state of their

W. A. Guy, M.D. places of work?——To some extent they are, and they often make representations to their employers. But the evil remains unredressed, for the simple reason that all the attempts made to introduce fresh air occasion draughts; so that no sooner is an opening made than the men who are working near it stop it up. The men cannot bear cold air, and are much more afraid of draughts than they are of the poisonous atmosphere which by enfeebling them makes them so sensible of cold.

Have you had occasion to observe any anxiety on the part of the labouring class to adopt measures for the preservation of their health?——Yes, among the more intelligent. I have been informed, for instance, by several compositors, that they reside a little way out of town in order to have the advantage of a walk to and from their work.

Are the employers willing to attend to the representations of their men with respect to causes affecting their health?——I have generally found them very willing to do anything which does not involve them in serious expense.

In your opinion, would any objection be made on the part of employers to a legislative enactment which should secure a proper ventilation of places of work?——I think not, provided they were not put to a very heavy expense.

Do you think that, without legislative interference, the representations of the men themselves would suffice to bring about a change for the better?——No. One of two things must happen. Ventilation must be enforced by law, or the means of procuring fresh air must be made cheap and of easy access. The great obstacles to improvement are the fear of draughts on the part of the men, and the expense and necessary alteration of the existing buildings on the part of the employers. No system of ventilation can come into general use which does not prevent draughts, which is not cheap, and which interferes in any great degree with existing structural arrangements.

You say that you have generally found employers willing to do anything which does not entail great expense, is this very generally the case?——Very generally; but I ought to add that when the greatest willingness has been shown, very slight obstacles have sufficed to prevent these good intentions from being carried into effect This happened in the case of a poor water-gilder, suffering from trembling palsy, caused by frequent exposure to the fumes of mercury. I suggested to his employer a very simple plan of getting rid of these poisonous fumes, and he promised willingly and gratefully to adopt it. I called after a few days, and found that he contemplated some alteration in his premises in two or three months' time, that he had thought of a plan that seemed to him preferable, and would then adopt it. Though evidently a humane and intelligent man, he seemed to think as little of this delay as if the health and life of a fellow-creature were not in question. Thus it is with all classes. They form a low estimate of the value of life and health. A man dies, and another replaces him without cost to his employer; but if it were a horse or a dog, the owner would have to pay for a new one. This makes all the difference. A man falls sick, and he, and not his employers, has to pay for his illness. A horse or a dog would have cost something. And yet these persons, who would be more anxious about a horse or a dog than about a man, are not necessarily hard-hearted. They have never been roused to a sense of the surpassing value of health and life. Even the educated classes are rendered in some degree indifferent to human life by a false theory, which, I believe, originated with a religious and humane man, or if not, is certainly entertained by many such men, namely, that plagues and consumptions were intended by Providence to keep down a redundant population. We now know better; and it may be hoped that better feelings will spring up with sounder information. There is much ignorance to be removed, and much prejudice to be overthrown before the rich will do justice to the poor, and the employer to the workman. Those who use glazed cards, for instance, little think how many palsied hands are due to the glaze which the manufacturers use. As little effort is made to substitute some wholesome material for common paint as if there were no such thing as painters' colic or the dropped hand. So also men are constantly breathing irritating fumes, and metallic particles, and poisonous air, with scarcely an attempt to get rid of them by ventilation or other efficient means. There is a general indifference on the part of the rich, and a corresponding recklessness on the part of the poor. A long time must elapse before either party will learn the true economy of health, and become duly impressed with the duty and gain of preserving it. **W. A. Guy, M.D.**

Have you had any experience in the ventilation of dwellings and workshops?——Yes, I have introduced plates of perforated zinc into the windows of the poor and into some of the reading-rooms in printing offices, with the best effect. The draught is the only objection which I find to a much more extensive use of this simple means of admitting fresh air. The benefit, in many cases, has been very great, and men are very grateful for it.

You are aware that it has been proposed to appoint health officers, who should visit houses in which deaths have occurred, report upon any causes of disease existing there, and recommend measures of prevention. Would such officers be useful?——There can be no question of their utility. I have myself lately performed the office of health-preserver on my own appointment, and all parties whom I have endeavoured to assist, both masters and workmen, have been very grateful for the advice I have given them. I will mention a case. A poor man came to the King's College hospital, in the first stage of consumption. He stated that he was a brass-finisher, and that it fell to his lot to pour aqua fortis on the metal, which produced acrid fumes of nitrous acid gas, and

A. Guy, M.D. that these were the cause of his illness. Accordingly I went to the workshop where he was employed, and found the following rude contrivance in use for carrying off these destructive fumes. The place of work was a narrow well of houses in one corner of which was a rude funnel of wood with a spout about 12 feet long. This was almost worse than nothing, for there was little or no draught through it in a still state of the air; and when the wind blew the fumes were forced down the funnel into the man's face. The first thing that I saw within a few feet of the funnel, as I cast about for a means of abating this nuisance, was a tall chimney connected with a furnace used on the premises. I directed that the funnel should be connected with the chimney, which was done, and in a day or two I had the satisfaction of finding my patient nearly well, and the red fumes of the nitrous acid curling out of the chimney. I have also found benefit of a most marked kind result from a little timely advice about ventilation, which patients have had the good sense to attend to.

In this case, then, your representations were immediately attended to by the employer?——Yes. No time was lost in abating the nuisance.

Can you give a short summary of the principal points of the evidence which you have now laid before the Commission?——The result is briefly this. There is no sufficient reason for considering consumption as an English disease. A certain amount of consumption, probably about one in seven of all deaths above 15 years of age, which is nearly the proportion occurring in the higher orders and in the most healthy professions, may be considered as inevitable; but all beyond that proportion admits of prevention. The annual waste of adult life from pulmonary consumption alone may be safely stated at upwards of 5000, and this estimate is probably much below the truth. The chief cause of this great mortality is the defective ventilation of houses, shops, and places of work. Next to this, in point of importance, is the inhalation of dust, metallic particles, and irritating fumes. One cause, over which the poor themselves can exercise control, is the abuse of spirituous liquors, a very fruitful source of consumption. I will venture to add my own strong conviction, that the sacrifice of so large a number of grown-up men and women has the indirect effect of increasing the population, of substituting young and helpless children, for adults capable of earning their own subsistence, and of contributing to the wealth and greatness of their country; that this waste of adult life is, in every sense and view of the matter, a great calamity and very bad economy, and to the extent to which its causes are generally understood by individuals or by the public a great and cruel injustice.

JOHN LIDDLE, ESQ., examined.

ARE you medical officer of the Whitechapel Union?——Yes. John Liddle, Esq.

What number of cases do you visit per annum?——During the first year, 1838, I had 986 cases; they have gone on regularly increasing, and they now amount to 2500. The annexed table gives a return of the ages and proportions of death in 1839, in the whole district of Whitechapel, from which it appears that the average age of all who die of the class of artisans is not more than 25 years, and that about one-half of their children born die before 10 years of age. More than one-half of those born, I should say, according to my own observation, and without positive enumeration.

What, with respect to overcrowding, is the state of the houses which you visit?——I know of few instances where there is more than one room to a family.

Have persons with large families any difficulty in procuring lodgings?——Most of the poor people with large families find great difficulty in procuring lodgings. A man of the name of Sculley, having a wife and five children, the other day told me that the only place he could procure for himself and family was a cellar in Beck's Rents, and for which he pays 1*s.* 3*d.* a-week. This was for the use of a cellar, which he inhabited with his wife and five children, the youngest about six months old. He added, "I had some difficulty in procuring any sort of lodging for my large family. I would willingly pay from 6*d.* to 9*d.* per week more if water was laid on in my room: it would be a great saving of time and expense; for if I want a cup of coffee in the morning, I am obliged to get up and fetch the water from a distance, or else to go to a coffee-shop, where I am charged more than it would cost me at home." He further described the condition of the court in which he was living by stating, "there is but one privy, which is always in a filthy state. I am frequently obliged to clean it myself, which is a most filthy job. I would willingly pay a small sum weekly for the convenience of a water-closet for myself and family, to be saved the unpleasant labour of cleaning the common privy in turn. If water were laid on in the house, all of us labouring men would keep ourselves much cleaner, and our houses would be much cleaner. The labour of fetching the water is the principal reason why the houses are not kept clean. The water which we keep in the house in tubs soon becomes spoilt and unfit to be used as drink. I would willingly pay a halfpenny per week to have the court and outside of my house kept clean."

Have you found in the course of your medical practice many instances of the extreme crowding of rooms, and their subdivision amongst separate families?——Yes; I have in a great many ohn Liddle, Esq.

DISTRICT:—Whitechapel Population, 71,758.

Class.	Number of Deaths of each Class.			Deaths from Epidemics.	Average Age at Death of all who Die above 21.	Average Age at Death, including Children.	Years Average premature loss of Life by		Proportionate Number of Deaths to Population.	Excess in Number of above a Healthy Standard.	Proportion per Cent. of Deaths to Total Deaths.		
	Adults.	Children under 10.	Total.				Deaths above Age of 21.	Deaths of all Classes.			Adults.	Children under 10.	Epidemics.
	No.	No.	No.	No.	Years.	Years.	Years.	Years.	No.	No.			
Gentry . .	17	4	21	. .	58	47	4	. .	1 in 31	768	·7	·2	. .
Tradesmen .	142	130	272	42	50	26	12	13			6·2	5·6	1·8
Artisans, &c.	741	637	1,37	261	48	25	14	14			32·2	27·7	11·3
Undescribed	116	313	429	107	58	16	4	23			5·	13·6	4·6
Paupers .	766	37	203	38	63	51	. .	. .			7·2	1·6	1·7
Totals . .	1,182	1,121	2,303	448	. .	. .	. .	. .	. .	. .	51·3	48·7	19·4
and													
Averages .	. .	. .	. .	. .	51	26	11	13	. .	. .	. .	. .	. .

Age of Living 26·2.

cases. The subdivision of rooms is very common in many places John Liddle, Esq in my district, and out of charity many of the poor give shelter to a houseless friend in the corner of the room, and this is sometimes the cause of fever in a family. An instance of a corpse being admitted into a room of a friend occurred the other day in the course of my practice. A young man died in the Blind Asylum, and the mother lived up two pair of stairs in a back room in a street leading out of the Commercial-road, where it appeared almost impossible to carry up a corpse, and a person of the name of Hildebrand, living in Crown-court, kindly consented to allow the body to be brought into her room, where her children were playing about (one of her children was ill at the time), she and her family, consisting of seven in all, were obliged to huddle together to sleep in a small back room.

What is the common size of the rooms?——About 12 feet by 8 would give a fair average size of the floors of the rooms; the ceilings rarely exceed 8 feet in height. In many of the garrets I am unable to stand upright. The number of persons living in a room may average about 5. This would average about 153 cubic feet of air for each person.

What is the height of these houses in stories?——The majority two and three stories high; in the majority also no light on the staircases; I find them dark and offensive. The close confined smell on the staircases is very offensive indeed.

What are the rents usually paid for these rooms?——1*s.* 6*d.* and 2*s.* per week; that is for the worst description of tenements; for the better description of places 3*s.* a-week may be given.

Has this state of over-crowding been increased?——In my opinion of late it has been increased in our neighbourhood, in consequence of the metropolitan improvements; a number of the poorer houses having been pulled down to make the contemplated new street from the docks to Spitalfields church.

In consequence of the demolition of the houses to form the new street, has it increased the crowded state of the houses in the district?——It has very much; some of the larger houses are now converted into lodging-houses, which for the most part are most shamefully crowded; and the houses in many places in my district are more densely inhabited, particularly Castle-alley, Tewksbury-court, and Lambeth-street.

In what state do you find these rooms in respect to ventilation?——Very bad indeed, from the over-crowding; from the privies in the lower part of the houses; from the dirty water and the dirty clothes in their rooms.

How are these tenements usually supplied with water?——Usually from a tap or standcock in a court. In some few of the better description of the houses I find the water laid on in the yards of the houses in butts.

John Liddle, Esq.

Are the labouring classes whom you have to visit as patients hard-working labourers?——Yes; they are mostly dock-labourers and persons employed at the water-side; they are also sack-makers, and some are employed as charwomen, and some engaged at slop-work.

Are their wives also labourers?——Yes; they are usually persons who sell things in the streets—vegetables, onions, fish, and other produce. I find, as a frequent cause of the illness of the infants, exposure with their mothers to severe weather in the streets.

Then, all classes under these circumstances will be the least disposed to take any extra labour that is not absolutely necessary?——I am compelled to visit their houses at all times, and it is common to me to see the husband, who has just returned home, lying on the bed fast asleep with his clothes on.

And that when you have not been expected to come in?——Exactly so: they never know at what time I may come, as I make it a point of never telling them.

Therefore, to fetch water after the labours of the day can scarcely be expected?——It is only done for the most urgent purposes; cleanliness is entirely neglected, and their persons and clothes remain in a most dirty state.

You have seen Mr. Toynbee's statement of the condition in which he finds the houses of the labouring classes in respect to water at the west end of the metropolis, where they are supplied from water-butts in the yards: what is the comparative condition in which you find the houses of the working classes in respect to supplies of water at the east end of the metropolis, where they are supplied with water from common cocks or stand-pipes in the courts?——My experience is precisely similar to that of Mr. Toynbee. The smell of their linen, when they give me a towel, which they tell me is quite clean, is often offensive. Their clothes are pressed through dirty water, to avoid the trouble of going out to fetch water.

In the houses which they inhabit would there be room for water-tanks or butts, supposing that to be an eligible mode of supply?——They might in every house have sinks, but there would be no room for butts or tanks. Many of the houses have no yards at all; the houses in some places are built back to back.

It is stated in evidence that water may be carried into a house and supplied at 1*d.* per week per tenement, and perhaps an additional rental of *d.* per week per room?——Not by the present monopolizing water companies.

If provision were made to accomplish that object, and it were accomplished, do you believe the convenience would be so far appreciated by the labouring classes as to induce them to pay the

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requisite addition to their rents to save the labour of fetching water from the common cocks?——Unquestionably they would. I can state a circumstance to show how much they appreciate the convenience of having water brought into the premises. In a place in Cartwright-street, where there are a number of small tenements surrounding a piece of waste ground, which tenements are occupied entirely by the labouring classes, a well has recently been sunk by the landlord, and a large tank erected over the well. This tank is filled by horse-power. From this tank pipes are carried, and the water is distributed into the several houses. The water is turned on three times a-week from the tank. Some of the houses have a water-butt in the cellar, and the privy is there also.

Are these houses visited by you?——Yes, they are visited frequently by me; and I may mention as evidence of their appreciation of the supply, that they now pay 3*s.* 6*d.* per week as rent, in lieu of 2*s.* per tenement, which they formerly paid. It appears that these houses were for many years in the opinion of the landlord underlet, but the tenants consider that the increase of the rent arises from the supply of water.

What are the usual rates charged for water when it is laid on the premises?——The New River Company offered to supply 100 houses on the above estate for 63*l.* per annum, the landlord agreeing to pay whether the houses were occupied or not, and the landlord was required to lay the water on to every house. This is now the custom, as there is so much less water required, it not running to waste as when there is a stand-cock in the court. There cannot be a doubt that the poor pay most exorbitantly for water; the water companies being monopolists, charge the landlords extravagantly high. Many of the houses in the neighbourhood have ball-cocks, made of tin japanned, in their water-butts.

What is the state of the cesspools in the districts which you visit inhabited by the working classes?——Usually in the courts there is only one cesspool. They are badly cleansed; often overflowing. The effluvium is most offensive and noxious. In many of the houses the privy is in the cellar. In one of the courts in Essex-street, now pulled down, the privy was within three yards of the door of one of the houses, and the soil was lying outside of the privy-door.

Where the cesspools are within the houses, do you not find them commonly very injurious?——Yes, and until they are removed good health cannot be expected in the district; and it may be said from their permeating the soil, however they are cleansed, that the inhabitants are living on a dung-heap.

Have new sewers been driven through the district of late?——Yes.

From the description you have given of the state of the courts

John Liddle, Esq. and alleys, these sewers have done little good to this class of habitations?——No, they are constantly wet with stagnant water. I scarcely know one place where a soil-pipe or house-drain has been carried from any court or house into the sewer; nevertheless, I believe the sewer has been useful, and has considerably diminished the surface-water in some places, so much so as to reduce the amount of fever.

You are aware that a new line of sewers has been made in a part of your district?——Yes, through four streets—White Lion-street, Leman-street, and Red Lion-street on the east, Prescott-street on the south, Mansell-street and Somerset-street on the west, and Great Alie-street on the north. These four streets enclose the large open space called the Tenter Ground. Three parts of this have been constructed rather more than two years.

Are any of the houses inhabited by the poor which you attend, that you are aware, drained into this sewer?——Not one in that district.

Are these sewers trapped?——Most of the sewers were now trapped. Soon after the sewer was opened, the waste hot water from the steam-engines of some sugar-bakers' premises ran through the sewer, and the effluvium arising from the open gully-holes became so intolerably offensive that the inhabitants complained urgently, and the sewers were trapped in consequence; but in the neighbourhood of Whitechapel and St. George's there are some gully-holes untrapped.

Since the houses of the poorer classes whom you attend are not drained into the sewer, is the presumption well founded that they derive no sanatory benefit from it?——I do not conceive that they derive as much benefit from them as might be effected.

Are you able to trace any improvement in the health of the new district?——There has been much less fever in our district, but I have been unable to trace it as an effect of the formation of the new sewer.

Has there been any diminution of the number of privies or cesspools by the formation of water-closets with drains communicating with the new sewers?——Very few.

Then the cesspools remain as they were?——Yes, nearly so.

Has the surface cleansing of the streets or alleys been improved?——No; the mode of cleansing the streets is very faulty. By the mode in which the scavenging is performed in the courts, I often doubt whether they do not create greater nuisances than they remove. I came home quite ill a few days since from being in one of the yards whilst the scavengers were at work.

Have you, do you believe, on the whole, less animal and vegetable matter remaining and decaying at any one time than formerly in the neighbourhood?——No; the matter in the slaughter-houses and the cess-pools remains the same as before; the surface refuse

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in the streets remains the same as before. The only effect of which I know is, that some of the better class of houses have been rendered less damp, and probably more comfortable. A landlord (who I may mention is a commissioner of sewers), in answer to the suggestion of the necessity of house-drainage, observed, "If every tenement is to have a communication with the sewers you will create a greater nuisance, and the house will be more unhealthy than at present, arising from the smell of the sewer." How the sewers can benefit the health of the poor living in the courts and alleys I am at a loss to conjecture. The poor are still exposed in the same degree to the pestiferous emanations of the overflowing of cesspools, decayed animal and vegetable matter, and stagnant water, which circumstances are proved, by direct experiment, to be the cause of fever; and without some legislative measures are speedily adopted to remove these evils, another epidemic similar to the one in 1838 will ere long make its appearance, which epidemic in the quarter ending Lady-day cost the Whitechapel Union upwards of 400*l*. The mere diminution of the surface-water can do but little good in removing the causes of fever; nay, it may even be productive of evil; for unless the heavier impurities are removed along with the surface-water, the exhalations arising from them will be more concentrated and dangerous.

You are of opinion, then, that private house-drainage and cleansing must be comprehended in any general measure of efficient sanatory improvement?——Undoubtedly it must, nothing efficient has been done; nothing will be done, unless it be general and compulsory, and enforced by a competent authority, *divested of local influence or connection.*

It is stated on the evidence of persons engaged in the occupation that the expense of cleansing a cesspool is, in the metropolis, about 1*l*. per annum, and that it constitutes a charge of 4½*d*. per week upon each tenement. It is also proved that if the system of keeping on water constantly at high pressure be adopted, that the use of water-butts and water-tanks may be entirely dispensed with, and water may be distributed into every room of such a house fresh from the general reservoir, or filter, at an expense not exceeding 1½*d*. per week; that for the cesspool a cleansing apparatus or soil-pan with water, of the nature of a water-closet, and the requisite drains may be substituted at an expense of not more than 1½*d*. per week, and all refuse be instantly removed in water through impermeable pipes, so that the foundation of the house need not be saturated with decomposing matter, and none need remain on the premises to give off effluvia; according to the experience and evidence of Mr. Toynbee, which you have read, it would appear that the whole of an existing tenement may be ventilated completely at an expense which need not add more than one halfpenny per week to the rental. Now supposing these several desiderata accomplished, John Liddle, Esq. the cesspool removed, abundant supplies of pure water carried into the houses to every floor, and if required into every room, and ventilation made effectual, can you form any opinion as to the extent to which sickness and mortality might be reduced by these several arrangements?——If these measures were carried out, I see no reason to doubt that the health of the labouring classes might be made quite as good as that of the better classes, and that it is practicable to do so. By the labouring classes I mean dock-labourers; but this observation does not apply to artisans engaged in unhealthy trades. The mental anxiety of many of the middle classes tends to the shortening of life. The nuisances which these measures would remove are in their excess the chief circumstances which distinguish the poor classes from the wealthier and middle classes. They would still have mismanagement of infants, of which I have spoken, and their exposure to the weather, but these are very subordinate. Drainage, supplies of water, and ventilation would extensively diminish existing mortality. I may mention one instance which shows the effect of a very partial measure, viz., of better paving and cleansing the surface of a court. Windmill-court, in Rosemary-lane, was one of the most unhealthy in my district. It was unpaved and filthy, and with stagnant water before the houses. I used to visit it sometimes two or three times a-day for fever cases. About 12 months ago it was flagged; it was well supplied with water from a large cast-iron tank, which enables the inhabitants to have a constant supply, instead of an intermittent one, on three days a-week. The court is regularly washed down twice a-week, and the drains are so laid that all the water passes through the privy and carries off the soil, which was formerly a most foul nuisance, and a constant expense to the landlord. In the seven months ending March, 1843, I attended 41 new cases of sickness in that court: in the last four or five months I have had but two cases.

It has been stated that sickness is the most common cause of the inability to pay rent, do you know if, in this instance, the rent has been better paid?——The rent is better paid, and the landlord is considered to have made a good thing of the improvements, which were executed at his own expense. There is no doubt that sickness is the most common cause of the inability to pay rent.

Have you, in the course of your practice, met with instances of the efficiency of such measures in effecting the recovery of the sick, as well as in warding off sickness?——I have lately found an instance of this at the London Hospital, where I was formerly a pupil, and on visiting it a few days since, I learned the effects of sanatory improvements which had been made there. They had improved the sewerage and drainage of the house, when an immediate and marked improvement in the diminution of the proportions of death took place. The buildings had been warmed

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by dry hot air, which was found not to answer well; and that form of warming was discontinued. A new wing was added to the hospital, by which the ventilation was improved; this imment was followed by a still more marked diminution of the per centage of deaths. The following are the numbers per cent. who have died during each year :—

1837	14	
1838	12½	
1839	9½	This year the sewerage was completed.
1840	9	Hot air discontinued.
1841	10	
1842	8	The new wing was opened.
1843	7	

Can you verify by your own observation as a fact that in the places which you visit the excessive mortality is accompanied by an excessive re-production; that the mortality does not diminish the population, but only renders it more wretched?——Yes, that is visible to all of us who visit these places; it is now universally acknowledged.

What are the physical characteristics of the population brought up under the circumstances you have witnessed?——Not nearly so robust as those brought up under better circumstances.

C. J. B. ALDIS, M.D., examined.

C. J. B. Aldis, M.D.

In what dispensaries have you acted as physician, and for what time?——I am acting as physician to the London Dispensary, which receives patients from a great portion of Bethnal-green and Spitalfields. At that dispensary, where I have acted for five years, we have about 3000 cases annually. I am physician to the Farringdon Dispensary, where we receive patients chiefly within a radius of a mile from Skinner-street, Snow-hill, chiefly from the neighbourhood of Holborn, Smithfield, Clerkenwell, Fleet-street, and the Old Bailey: there they receive 5400. I act as physician to the Surrey Dispensary, where we receive patients from two districts; one, the eastern district, extending from London Bridge to Millpond Bridge; and the western from London to Vauxhall Bridge. The whole number at the Surrey Dispensary may be about 7000. There are four physicians connected with the Surrey Dispensary.

In these different dispensaries do you, when necessary, visit the patients at their own habitations?——Yes, we do.

In what condition do you find the places of habitation which you visit?——Generally one badly-conditioned room occupied by a whole family, badly ventilated and filthy. The greatest overcrowding is displayed in Field-lane and its neighbourhood, in the courts leading out of Smithfield, in the courts leading out

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of Fetter-lane, and the courts and buildings leading out of Fleet-street.

Some of the worst features of overcrowding are displayed on the Surrey side of the river, in the neighbourhood of the Mint, otherwise the characteristics are common. Within the rooms close offensive smells, the atmosphere quite vitiated, the fæcal smell of the cesspool is often distinguished; the courts are uncleansed and in a dirty condition. Some of the streets in Spitalfields are remarkable for their filth. The most overcrowding in the district of the London Dispensary is detected in the neighbourhood of Artillery-passage, Bell-lane, and Petticoat-lane.

It has been stated in evidence before the Board, that the overcrowding in the houses in the vicinity of Spitalfields has been greater in consequence of the alteration now in progress for the new street, does your knowledge of the district enable you to confirm this statement?——It does; for instance, Keate-street, Keate-court, and its immediate neighbourhood, situated in Spitalfields, have become overcrowded in consequence of the improvements now going on in Essex-street, Whitechapel; and I have been informed that four cases of fever have been received into the workhouse at the same time from one habitation in consequence of this increased pressure.

In what state do you find the drains, sewers, and water supplies?——I have observed them to be in a very neglected condition. At the back of Ray-street, Clerkenwell, which is densely populated, a most offensive and open drain, a part of Fleet-ditch, passes by the back of the houses, and takes its course parallel with Great Saffron-hill, running under West-street, where it disappears. The evils from this open sewer are of course most felt in the summer, when the stench is intolerable. I have noticed similar nuisances in Lock's-fields, Bermondsey, and Rotherhithe. In many places the refuse water, which has been employed for the purposes of cooking and cleansing the houses, flows through gully-holes into the kennels in the street, where it frequently remains stationary, producing in warm weather the most offensive exhalations. Old Nichol-street, with some streets in its vicinity, situated in the district of the London Dispensary, is very offensive in warm weather, in consequence of the exhalations from stagnant water. I am called upon to visit more cases of fever there than in any other part of the district. In regard to the water supplies, they are little calculated to add either to the comfort or health of the poor. In many courts there is only one supply of water for all its inhabitants, and it occupies a good deal of time to procure it and carry it back to the different rooms, where it soon becomes covered with black scum. There is generally a filthy accumulation on the surface of the water in the water-butts. In some courts there is no supply of water; such is the case in Ireland-court and

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Lusigneas-buildings, Red Lion-street, Spitalfields, which I visited to-day. One woman informed me that her husband lay dead, and that she could not obtain water without the greatest difficulty to wash his "rags." I went into her room, and found her husband lying dead in a coffin; the room was small, dark, and dirty, and occupied by six children, in addition to the father and mother. Another female represented the place to be "stinking alive" for the want of water. In the neighbourhood of Field-lane some persons have not even cesspools or privies; all their excrements are thrown into a little back yard, where they are allowed to accumulate for months together; others have a cesspool, but it is not provided with a drain, so that the excrements run into courts or streets, where they remain until a shower of rain washes them into the gutter. These are the places we are called upon most frequently to visit.

What is the usual size of the rooms occupied by the single family?——Each room measure from 8 to 10 feet by 8, and from 6 to 8 feet from the floor to the ceiling, in the neighbourhood of Field-lane.

What rents do they usually pay?——The rents are from 1*s.* to 2*s.* for each room weekly; the rent for some of the larger rooms is from 3*s.* to 4*s.* 6*d.* per week.

Are the patients of the condition of artisans?——Generally so. In Spitalfields they consist chiefly of weavers.

Can you state the average earnings per week?——I am told that the average does not exceed 8*s.*, and from this even some deductions are made.

As physician to these institutions, what are the chief species of disease you find in the dispensaries most commonly attendant on the physical circumstances or upon the atmospheric impurity caused by filth, decomposing animal and vegetable matter, and defective ventilation?——The regularly recurrent diseases are fever cases, inflammatory affections, and derangements of the intestinal canal. When heat and moisture prevail, I anticipate the occurrence of febrile diseases in various forms. In one place the same general state of the weather will be attended with ordinary fever; in another place, at the same time, with small-pox. At the same place, where fever occurs, it will occur in different forms. For example, in a house at the corner of George-street, Spicer-street, near Hanbury's brewhouse. This house was situated in the front of a dirty swamp with stagnant water, now occupied by the new buildings of Hanbury's brewhouse. The house, from its situation in front of the swamp, would receive the force of the exhalations from it whenever the wind was in the direction of it. I attended six cases of remittent fever in one family. This family occupied one room on the first floor. The father was a weaver in the same room, and worked the loom close to the head of the eldest patient,

C. J. B. Aldis, M.D. his daughter, who lay on a bed on the floor in a state of delirium. She occasionally obtained intervals of repose, from which she was roused by the working of the loom. On the ground floor I was attending, at the same time, a patient in another family, suffering from scarlet fever. This is an example of such cases as those mentioned by Dr. Ferguson, and quoted by Dr. Mason Good, where persons stationed near marshes, those nearest to them suffer with the most severe form of fever, whilst those who occupied higher ground were attacked with a different and milder form of fever. More commonly we are rather called upon to attend different cases of fever occurring in different houses of the same street than in different rooms of the same house. The different forms of disease in the different houses we find attended by different circumstances; one may have an open drain or cesspool behind; the other may be a house in a close and confined situation, admitting of little ventilation, and subject to the concentrated action of whatever impurity there may be. Generally we find the most severe attacks of disease in the worst conditioned places. Very recently the places which I have mentioned as the worst conditioned in the district of the Farringdon Dispensary, namely, Field-lane, Clerkenwell, and the courts out of Fetter-lane, and the neighbourhood of Smithfield, have been subjected to an attack of epidemic small-pox, which has been as virulent as a plague. I have found as many as three cases of small-pox, a mother and her two children in one small bed, and another child in the next room suffering from confluent small-pox; the mother having refused to adopt my advice, and send the case first attacked to the small-pox hospital. The same disease has also been lately very prevalent in the crowded parts of Bankside, which is situated in the western district of the Surrey Dispensary. It is now making its appearance in Spitalfields.

In these ill-conditioned districts, are not the tradesmen and other classes living in better conditioned houses sometimes attacked?——Sometimes, but comparatively rarely, and the diseases are less fatal.

Besides this description of cases, do you find any species of chronic disease attendant on the physical condition of the population in respect to defective ventilation and cleansing?——These cause the vitiated atmosphere, and the close state in which the patients live produces first physical depression, then functional disorder, and ultimately organic change. Glandular swellings are produced, scrofulous affections of different parts of the body, and scrofulous ophthalmia. Lately I accompanied Mr. Crookes, one of the surgeons to the Farringdon Dispensary, to one or two of his cases. One of them was a case of scrofulous, or, as it is sometimes termed, strumous inflammation of the eyes. The place was a low dark room, more like a den than the habitation of a human

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being. The patient was a female, and Mr. Crookes observed to her, medicine was of no use so long as she remained in so confined a place; that in order for her to recover she must change her residence. I have been accustomed to make similar observations to my own patients.

What is the ordinary physical condition of the population brought up under the physical condition you describe?——They are emaciated, pale, and thin, and in a low condition, the cases of asthenia being of common occurrence. They complain of sinking, depression of the strength, of spirits, loss of appetite, accompanied by pains in different parts of the body, with disturbed sleep. This feebleness of constitution, among other causes that come before us, may be ascribed to the unwholesome habitations in which they reside. We find, indeed within our experience, considerable differences in respect to this depressed condition. I usually warn pupils that they must not bleed freely in the depressed districts. Bleeding, which may be resorted to freely in rural districts, or in comparatively healthy suburban town districts, cannot be resorted to safely to the same extent in the more crowded and depressed districts. I find, whatever may be their condition as to employment, that more stimulants are requisite in proportion to the depressing influence of the impure atmosphere in which they reside. In all cases of disease, the removal to a purer atmosphere, or from their close rooms to the more spacious and better ventilated wards of the hospital, gives early relief. The depressed and low condition of health in which these people are always found, induces habits of intemperance unfortunately so common among them.

In such visits as you have to make into the rooms described, do any circumstances come under your observation which tend to show any moral as well as physical effects arising from this overcrowding?——Sometimes I have found grown-up young men sleeping in the same bed with a middle aged or young mother, brothers and sisters above the age of puberty lying in the same bed. In one case of melancholia in a young woman, which ended in insanity, she described the cause as arising from an incestuous intercourse with her brother. But the moral effects only come to our knowledge accidentally.

Do you find a due attention paid to the separation of the sexes in the lodging-houses, or that there is any distinction made in the apartments set apart for the married or single people?——The sexes are not properly separated in the lodging-houses, for single males and females sleep in the same room, in beds about six inches apart. The lodging-house keepers profess to make a distinction between the "married" and "single rooms," which no doubt is generally maintained, but not always. I happened to be in one of these lodging-houses in Keate-court the other day, and was shown into the "married room," where I observed five beds; the room

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was small, and four of the beds were large enough to contain two persons in each. The landlord told me that the fifth bed was occupied by a single female. Each lodger pays three-pence a-night for the bed, and if two individuals, male and female, enter the house together, no question is asked as to their being married, and they sleep in the same bed.

You have twice mentioned Field-lane and its neighbourhood as a district where the inhabitants were densely crowded, and suffering from fever, do you find any other causes for the unhealthiness of this district?——The courts in Field-lane are low and ill-ventilated, leading to back yards and houses. The yards are strewed with decayed vegetables, dust heaps, dung, human excrements, and other putrescent substances. In one yard I have noticed some pigs. I find the cesspools imperfectly covered, and the privies in a most filthy condition. All this must necessarily occasion effluvial poisons. Red Lion-court, Saffron-hill, is quite unfit for human beings to dwell in; the houses are in a most dilapidated and dirty state. The privies and back yards are exceedingly disgusting, the former being filthy and out of repair, and both emitting a most horrible stench. One yard, especially pointed out to me, was filled with a mass of putridity. There are no privies to some of the houses. Other sources of unhealthiness may arise from the knackers' yards, in one of which I was informed that 60 horses were slaughtered weekly. Different kinds of animals are skinned here, and the bones boiled, which occasion a sickening smell, and heaps of bones may be seen in the yard, the washings of which, with the offal from the animals, are thrown into the Fleet-ditch already mentioned.

Do you now from dispensary practice find ague prevailing in any parts of London?——Patients attacked with ague not unfrequently apply for admission to the Farringdon Dispensary; they come from the "Valley of Holborn," as it is sometimes called, and I am told, on good authority, that intermittent fever is occasionally produced in Pimlico and Camden Town.

To what extent do you consider the excess of mortality, and its corresponding sickness, admit of abatement by administrative measures?——A very large diminution may without doubt be made; such a diminution as has been made in the sickness and mortality formerly prevalent amongst the higher and middle classes, apparently by the improved condition of their dwellings and the streets. Many of the districts I have had to visit are apparently as filthy as the whole of London was described to have been at the time of the plague. I have stated that the small-pox has fallen like a plague on some of the worst conditioned spots. The crowding of the habitations is apparently increasing. I am informed that the alterations now making in St. Giles's have contributed to the overcrowding a part of Westminster and Drury-lane; this I am in-

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formed by a pupil who lives close to St. Giles's. The epidemics, continued fever, and even small-pox are increasing, and I imagine that no one will venture to deny that conditions of the atmosphere may occur which might produce in these districts a dreadful mortality. I may mention that I have become so much impressed with the importance of ventilation that I have proposed to some of the committee of the Surrey Dispensary the application of the ventilators used by Mr. Toynbee as one of the most important charities that can be promoted in the overcrowded neighbourhoods.

The present registration of births shows an excess of births above even the excess of deaths in the least healthy of your districts; for example, it appears that the positive number of births beyond the rate of births in healthier districts, such as Camberwell for example, where the births appear to be 1 in 44, and in the less healthy districts the proportion is 1 in 33. Thus if the same difference existed in all parts of London it would cause an excess of births to the amount of 4633. Does your experience confirm this great excess of births?——The only means we have of judging of the births in these districts is by the number of children whom we see in these places. I find the rooms where we attend, the courts and alleys where the houses are situated, commonly crowded with children.

E. RIGBY, M.D., examined.

E. Rigby, M.D.

ARE you senior physician to the General Lying-in Hospital in the York-road, Lambeth?——I am.

How long have you been a medical officer to that institution? ——Since 1832.

It may be presumed that a lying-in hospital, from the peculiar susceptibility of the patients, is a place in which the effects of atmospheric impurities, or miasma, would be more strikingly manifested than with any other class?——Yes—*cæteris paribus*, their effects would be more immediately manifest on such patients than upon any other class. From the various circumstances which are connected with the puerperal state, few patients render the surrounding air impure from animal effluvia more rapidly than lying-in women, fever cases, perhaps, excepted.

In the management of the General Lying-in Hospital were any difficulties encountered, either from the locality of the building, defective state of the house-drains, or adjoining sewers, or from deficient internal ventilation?——The hospital was seldom free for any length of time from puerperal fever, occasionally producing frightful ravages and requiring the building every now and then to be closed. After the greatest attention had been paid to

E. Rigby, M.D. cleanliness in every respect, the wards left open night and day for weeks, fumigated, the walls limed and painted, the beds thoroughly cleaned, fumigated, repaired, and frequently renewed, and the most scrupulous attention paid to cleanliness, the fever re-appeared, on some occasions *immediately*, on the hospital being re-opened. This circumstance made us look to external causes, when we ascertained that in the immediate vicinity of the hospital there were upwards of 1500 feet of open ditches, receiving the drainage of the poor and dense population of the neighbourhood, one of the ditches being not more than 30 feet from the walls of the building. It was black and stagnant, and in constant ebullition from the disengagement of gas. After great difficulty and trouble, the hospital having to bear a large proportion of the expense, the Commissioners of the Sewers were induced, although with much reluctance (in October, 1838), to have a portion of these ditches cleaned and properly arched over; an immense quantity of black pestilential mud was excavated, but instead of being removed, it was spread over the adjoining ground.

Was any effect manifest from this spreading of the soil, and increase of the surface emanations?——At that time the hospital was free from disease, but two cases of puerperal fever occurred within 24 hours after this unjustifiable act.

What extent of these ditches has been bricked over?——644 feet were bricked over; which, deducted from the 1500, leave 856 feet of open ditch still uncovered.

By whom were these expenses borne?——The Commissioners of Sewers (Surrey) agreed to bear one-third the expense, but required the other two-thirds to be paid "before they entered into any contract for excuting the work." The following account stood between the Commissioners and the hospital, 15th September, 1838:—

	£.	s.	d.
Contract for the 404 feet	329	14	0
Further length 240 feet, at 16*s.* 4*d.*	195	0	0
	525	14	0
Deduct one-third payable by the Commissioners .	175	4	8
	350	9	4
Paid by the hospital	300	0	0
Balance	50	9	4

Had you still cases of disease?——Puerperal fever still continued to make its appearance from time to time, and occasionally with great severity. As the physicians were dissatisfied with the existing means for ventilating the wards to such an extent as could be done with safety to the patients, and as it was found that unless quickly changed, he air became speedily loaded with effluvia, it was deemed advisable, in April, 1842, to adopt Dr. Reid's plan of

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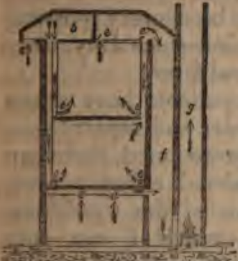
ventilation, and, accordingly, a large sum was expended in the necessary alterations. The scheme adopted by Dr. Reid was upon the following plan :—



Fresh air was introduced under the roof *a*, that it might enter from the purest source. From the general air-chamber *b* it descended to the separate apartments. A hot-water pipe *c* gave it a moderate warmth; double glass windows gave additional warmth. A vitiated air-chamber *e* regulated by valves received the air from the rooms. The air in the basement was prevented from passing into the wards above by the flue *e*, the air from it with that from the chamber *e* in the roof, passing to the descending shaft *f*, from which it passed ultimately into the discharging shaft *g*.

When this new plan came into operation, much opposition was experienced from the female attendants, and great difficulty in preventing them from closing the different valves for admitting fresh, and emitting foul air. In November, 1842, during a moist and unusually warm state of the atmosphere for that season of the year, I found, on visiting the hospital one evening, that the air of one ward which had its full number of patients, all of whom had been recently delivered, was exceedingly close and oppressive, and the thermometer at 75°, and it was stated to have been even so high as 78°, the air had a decidedly sour smell, and was evidently much loaded with effluvia. This improper state of things had been produced by closing the valves and cutting off the ventilation, in defiance of my strict orders to the contrary. I strongly remonstrated, declaring that puerperal fever would appear within 24 hours. In 18 hours' time I was called to see a woman with symptoms of the disease in that ward; she died, and several other women in the same ward were also attacked, but if I recollect rightly, recovered. The hospital continued in an unhealthy state until the following spring, when on finding (February, 1843) that water rose at times in the bottom of the shaft, where the fire is placed for producing the current of air, Dr. Reid carefully analyzed some of it, and declared his conviction that it must have proceeded from some obstructed drain in the neighbourhood. The entire drainage of the building was thoroughly examined, and it was then ascertained the main-drain was entirely blocked up by two logs of wood. The whole basement was flooded with every description of decomposing impurities, and it was impossible to tell how long this state of matters had existed. The whole ground must have been saturated with impurities to an extreme extent. In July, two of my own pupils became house-surgeons to the establishment; gentlemen in

E. Rigby, M.D. whom I placed the fullest confidence, and who carried out my orders respecting the ventilation of the wards in spite of much opposition and personal annoyance. From that moment we have not had a case of puerperal fever; patients have been admitted broken down by poverty and misery; severe and dangerous labours have occurred among them, and there has been every possible variety of weather, but up to the present time since July, there has not occurred the slightest trace of puerperal fever.

Might not the improved healthiness of the patients have arisen from the drainage being put into thorough order and repair?——Under the circumstance in which the drains were found, there can be no doubt but that their being again rendered effective must have been beneficial to the hospital. The air of the wards was always close, oppressive, and bedroomy, which I can only attribute to want of proper ventilation. On the other hand, as soon as Dr. Reid's plan of ventilation was permitted to have a fair trial, the air in the wards became not merely free from effluvia, but has now a remarkably clean, clear, refreshing feel, which I can only compare to the sensation produced on entering an empty room which has been recently whitewashed.

What is the nature of puerperal fever?——It is of the same class of diseases as the plague, yellow fever, and the putrid marsh intermittents of tropical climates, &c.; diseases which essentially depend on a vitiated state of the blood arising from the introduction of some (usually animal) poison into the circulating current.

Is it communicable in the same way as the diseases to which you have alluded?——It is. It may in the first instance be generated under the ordinary circumstances, which are known to favour the production of typhoid fevers; it may be propagated by contact, and it may become infectious from the air being charged with effluvia emanating from the patient or her discharges. On this latter point I would, with permission, quote a passage from a work of my own on these subjects:—

> "The lungs afford a ready and ample means by which effluvia may be conveyed into the circulating current, and enables us to account for the fact adduced by Dr. Stevens, that in situations favourable to the production of fevers, the blood is frequently found in a very unhealthy state, even before the outbreak of the disease itself."

In your practice as a physician, have you had occasion to notice in private houses defects such as you experienced and struggled with at the hospital?——I have every reason to believe that in a large majority of cases the ventilation of private houses is very inferior to that of our large hospitals, more particularly as regards the effluvia from drains, &c. The arrangements also for ventilating the sleeping-rooms, especially the servants' bed-rooms, are very defective; the peculiar close, disagreeable smell of these latter chambers must be familiar to all.

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These defects, then, are not confined to the houses of the poor, but exist also in those of the wealthy?——They do; and in houses which have been built many years, to a great extent.

Can you give some instances?——I may mention one family, the members of which were constantly exposed to the effluvia and stench arising from bad drains; they never had a cook remain with them long without suffering severely in health; as the state of the drains became worse, they all suffered, and at my urgent advice removed to a healthy suburb of London with the most marked effects in the improvement of health. These defects, as regard effluvia and stench arising from defective drainage, exist also among houses comparatively or quite new; for instance, in the Marylebone district, and even among some of the recently built houses of Hyde Park. In the former locality I am at this moment attending a lady in her confinement, whom I have with some difficulty rescued from an attack of puerperal fever, which threatened to assume the malignant form. On being summoned to her when in labour, I was struck by the offensive drain effluvia, which not only pervaded the lower parts of the house, but rose perceptibly from the area as I stood at the hall door, and I cannot help attributing this attack coming on, under all the favourable circumstances of wealth and station, to the deleterious influence to which I have just alluded.

Does your experience as a physician enable you to vouch for the integrity of the sense of smell as a warning against injuries to the public health?——I consider that it is frequently the most useful sense in detecting atmospheric impurities. On many occasions, especially in midwifery practice, the sense of smell during the short interval in passing from the door to the patient's bedside gives me more accurate information with regard to the circumstances under which the patient is placed on many very important points than I can gain by other means during the rest of my visit. A crafty nurse may hide much from the eye, but she can conceal nothing from the nose of a medical man who is at all experienced in these matters. In coming home at night, or in the early morning, through those streets which consist chiefly of shops, and where some of the inmates frequently sleep in the basement story, if it has been warm weather, and the window beneath the area grating was left open, the dense effluvia of a close and heated bedroom is not merely perceptible, but very offensive. On many occasions we may detect by our sense of smell the vicinity of a sewer grating, by the effluvia which is exhaling into the street, although it may be 20 or 30 yards distant, and which I consider to be a strong argument in favour of all these openings into the sewers being properly fitted with a trap.

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On the Physical Causes of the High Rate of Mortality in Liverpool. By W. H. Duncan, M.D., *Physician to the Liverpool Infirmary, and Lecturer on Medical Jurisprudence in the School of Medicine, Royal Institution.*

It has long been known that where a number of individuals are gathered together within a narrow compass, as in towns, the mortality among them considerably exceeds that occurring among an equal amount of population scattered over an extended surface, as in country districts. But it is only within the last few years, since the Registration Act for England and Wales came into operation, that we have been enabled to give precision to this knowledge by an appeal to facts upon a large scale, and of undoubted authority, by means of which we have ascertained the exact amount of the difference, and may point, with confidence, to the causes in which it has its origin. In the Appendix to the Third Annual Report of the Registrar-General, a statement is given of the relative mortality of a town and country population, amounting, in each case, to upwards of three millions and a half, and combining the results of the observations of two years, 1838-39:—

Table 1.

—	Area in Square Miles.	Estimated Population, January 1, 1839.	Deaths Registered in Two Years.	Inhabitants to One Square Mile.	Annual Mortality.
					1 in
*Country Districts .	17,254	3,559,323	129,628	206	54·91
Town Districts . .	747	3,769,002	197,474	5,045	38·16
England and Wales .	57,805	..	..	265	46·00

Another evidence of the greater unhealthiness of towns is afforded by the comparative longevity of the inhabitants of the different districts, as shown by the following table, in which the proportion of deaths, out of every 1000, which occurred at the age of 70 and upwards, in Devonshire, Dorsetshire, Wiltshire, Cornwall, Somersetshire, Norfolk, Suffolk, Cumberland, Westmoreland, Northumberland (except the mining part), and Lancashire (North of More-

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* The country districts included in this statement comprise the counties of Cornwall, Devonshire, Dorsetshire, Essex, Gloucester (except Bristol and Clifton), Hereford, Norfolk (except Norwich), Somersetshire, Suffolk, Sussex, Westmoreland, and Wiltshire. The town districts include the Metropolis, Bath, Birmingham and Aston, Bristol and Clifton, Cambridge, Carlisle, Derby, Dudley, Exeter, Leeds, Leicester, Liverpool and West Derby, Manchester and Salford, Maidstone, Newcastle-upon-Tyne, Northampton, Nottingham, Sheffield, Stoke-upon-Trent, Sunderland, and Wolverhampton.

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cambe Bay), is contrasted with the proportion occurring at the same ages in the metropolis, Birmingham, Leeds, Manchester, and Liverpool.

TABLE 2.

—	Total Deaths, 1839-40.	Deaths at 70 and upwards.	Deaths at 70, &c., to every 1000 Deaths.
Country	52,204	10,538	202
Towns	71,544	6,457	90
England and Wales . .	..	..	141

To this it may be added, that the average age at death in two counties (Rutland and Wilts), was 36½ years; and in four towns (Liverpool, Manchester, Leeds, and Bolton), 19 years.

More than one cause may be assigned for this marked difference in the mortality of town and country districts; but the one great cause, which in its operation seems to absorb all others, is the vitiation of the atmosphere of towns; to effect which a number of agencies are constantly at work. By the mere action of the lungs of the inhabitants of Liverpool, for instance, a stratum of air sufficient to cover the entire surface of the town, to the depth of three feet, is daily rendered unfit for the purposes of respiration. If to this we add the changes caused by the products of combustion from forges, furnaces, and other fires, mingling with the atmosphere (to say nothing of the enormous quantity of gas, oil, and candles nightly consumed in large towns), and by the escape of gaseous effluvia from manufactories of different kinds, we shall have enumerated the principal sources of the unavoidable vitiation of the air of towns.

But it must be remembered that wherever large masses of the community are congregated together, there is a proportionally large amount of vegetable and animal refuse produced, which, in the process of decay, gives out various gases prejudicial to health, and whose effects will be proportioned to the more or less immediate removal of the matter, or to the attention given to its being so disposed of as to prevent the escape of the gases into the general atmosphere. Further, it has been observed that where a poor population is densely crowded, a kind of poisonous matter, of a highly contagious character, is generated in the system, affecting with typhus and other fevers not only those in whom it first originates, but spreading with rapidity amid such a population, from individual to individual, from house to house, and from street to street. Could the atmosphere, in such localities, be renewed from time to time, the evil would be diminished; but from the high value of land in the larger towns which are the seats of industry, from the desire on the part of builders and landlords to secure the most profitable investment for their money, and from the total ignorance or neglect of hygienic principles, the dwellings of the poor have been constructed with the most notorious inattention to the means necessary to secure an efficient ventilation, either in the houses themselves, or in the courts and streets inhabited by the working classes. It is not my intention to enter at any length on the consideration of the share which poverty has in augmenting the mortality of towns in general, or of Liverpool in particular; but as conclusions drawn from comparative statements of mortality in classes of the population differing very widely in their command of the necessaries of life, would be obviously liable to suspicion, I may state that there is less difference in this respect between the town and rural population of this country than might, *à priori*, be supposed. Mr. Farr, in his first letter to the Registrar-General, says, (p. 78): "The occupations in cities are not more laborious than agriculture, and the great mass of the town population have constant exercise and employment; their wages are higher, their dwellings as good, their clothing as warm, and their food certainly as substantial as that of the agricultural labourer. The Poor Law Inquiry, and successive Parliamentary Committees, have shown that the families of agricultural labourers subsist upon a minimum of animal food, and an inadequate supply of bread and potatoes. The source of the higher mortality in cities is, therefore, in the insalubrity of the atmosphere." On the other hand, it appears from a return quoted by Mr. Chadwick, "obtained in 1836, and presented to the Manchester Statistical Society, of the cattle passing the toll gates and the meat sold in the markets, that the consumption exclusively amongst this population (the factory classes) could not be less than 105 lbs. each person annually, man, woman, and child, or 450 lbs. yearly per family, of butchers' meat alone, exclusively of bacon, pork, fish, and poultry."* Be this as it may, it appears from statistical documents presented to Parliament, that the proportion of paupers to the entire population is considerably greater in the agricultural than in the manufacturing counties; the 15 principal agricultural counties having 1 pauper in every 8 of the inhabitants, while in the 12 principal manufacturing counties the proportion is only 1 in 13. In Lancashire it is 1 in 11.†

But although it has been generally believed that large towns are more unhealthy than the open country, there has been, until very lately, a prevalent impression among not only the professional but the non-professional part of our own community, that, as compared with other large towns, Liverpool occupied a favourable place in the scale of mortality. The fact, however, is, that judging from the annual proportion of deaths to the population, Liverpool is the most

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* Report on the Sanatory Condition of the Labouring Population of Great Britain, p. 182.

† See Appendix E. to Eighth Annual Report of the Poor Law Commissioners; and tables complied from it, in *Morning Chronicle* of 5th November, 1842.

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unhealthy town in England. The following table gives a view of the relative mortality of seven of the principal towns, calculated on the average of the three years 1838-39-40:—

TABLE 3.

Towns.	Population, 1841.	Deaths.
Metropolis	1,870,727	1 in 37·38
Birmingham	138,817	,, 36·79
Leeds	168,667	,, 36·73
Sheffield	85,293	,, 32·92
Bristol	64,298	,, 32·38
Manchester (Union)	192,408	,, 29·64*
Liverpool (Parish)	223,054	,, 28·75*

The proportion of deaths occurring at the age of 70 and upwards, in the different towns, shows nearly the same result; but it is to be remembered that no absolute inference as to the healthfulness of these places can be drawn from this, unless the proportionate numbers living at the age of 70 and upwards were exactly the same in each town. Until the results of the late census are laid before the public, we can have no means of correctly ascertaining the proportions living at different ages.

TABLE 4.†

Towns.	Total Deaths. (two years) 1839–41.	Deaths at 70, and upwards.	Number of Deaths to every 1000 Deaths.	
			Above 70.	Below 5.
Metropolis	93,030	10,358	111	408
Birmingham	7,456	654	88	482
Leeds	8,701	688	79	480
Manchester	16,546	990	60	510
Liverpool (Parliamentary).	18,084	970	54	528

It is important, also, to bear in mind, that statements of the proportionate mortality of different towns or districts do not of themselves afford evidence, which can be absolutely relied on as to the comparative healthfulness of those localities; for it is quite possible that the proportionate mortality of two districts may be the same, and yet the chances of life (or the average duration of life) may be considerably less in the one than the other, from the fact of a larger proportion of the deaths occurring at an early age. The following table,‡ however, showing the average age at which the deaths occurred during one year, in five of the principal towns, confirms the fact of the extreme unhealthfulness of Liverpool, already inferred from the table of proportionate mortality.

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* The rate of mortality in Liverpool and Manchester is deduced from the average of the five years, 1838–42.

† For convenience' sake I have added to this table a column exhibiting the proportionate numbers of deaths below the age of five. These facts will be subsequently referred to.

‡ See Sanatory Report, p. 176, Note.

TABLE 5.

	Average Age at Death.
Metropolis, *i. e.*, Kensington, Strand, Whitechapel, and Bethnal-green Unions	26½ years.
Leeds	21 ,,
Manchester	20 ,,
Bolton	19 ,,
Liverpool	17 ,,

The causes of this unfavourable position of Liverpool, both absolutely and relatively, will be found to be the same as those already indicated as the sources of the higher mortality of towns generally, and which appear in Liverpool to reach their maximum degree of intensity.

The population of the parish of Liverpool, by the census of 1841, amounted to 223,054; of whom about 160,000 may be estimated to belong to the working classes; and of these it is well known that a large proportion inhabit courts and cellars, the remainder living in houses or rooms to the front of the street. The COURTS, in which so many of the inhabitants of Liverpool reside, consists usually of two rows of houses placed opposite to each other, with an intervening space of from 9 to 15 feet, and having two to six or eight houses in each row. The court communicates with the street by a passage or archway about three feet wide,—in the older courts, built up overhead; and, the farther end being also in many instances closed by a high wall or by the back or side of an adjoining building, the court forms in fact a *cul-de-sac* with a narrow opening. Such an arrangement almost bids defiance to the *entrance* of air, and renders its free circulation through the court a matter of impossibility. When other circumstances, to be afterwards mentioned, are taken into account, such as the dense population and abominably filthy state of many of the courts, it is easy to understand in what way the construction of these dwellings may contribute to swell the mortality of Liverpool. The houses themselves are three stories high, contain three rooms of about 10 or 11 feet square, and being built back to back with the houses of adjoining courts, there is of course no thorough draught. An enumeration of the court and cellar population of the borough was made two years ago, under the authority of the Town-Council, when it appeared that there were, in the parish of Liverpool,—

Courts.		Houses.		Inhabitants.
1982	containing	10,692	and	55,534.

That is to say, more than one-fourth of the whole parochial population, or more than one-third of the working classes, were residents

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in courts. With regard to the *character* of these courts, it appears from the Report of the Corporation surveyors, that—

629, or nearly one-third, were closed at both ends;
875, or less than one-half, were open at one end; and only
478, or less than one-fourth, open at both ends.

The CELLARS are 10 or 12 feet square; generally flagged,—but frequently having only the bare earth for a floor,—and sometimes less than six feet in height. There is frequently no window, so that light and air can gain access to the cellar only by the door, the top of which is often not higher than the level of the street. In such cellars, ventilation is out of the question. They are of course dark; and from the defective drainage, they are also very generally damp. There is sometimes a back-cellar, used as a sleeping apartment, having no direct communication with the external atmosphere, and deriving its scanty supply of light and air solely from the front apartment.

The enumeration already alluded to showed that there were, in the twelve wards forming the parish of Liverpool,—

Inhabited Cellars.		Inhabitants.
6,294	containing	20,168,

exclusive of the inhabited cellars in courts (of which there were 621, containing probably 2000 inhabitants). From pretty extensive data which I have in my possession, I should be inclined to think these numbers, both of the court and cellar population, to be under the mark; but as they profess to be from actual enumeration, I am of course bound to take them as I find them.* Of the entire number of cellars, 1617 have the back apartment I have mentioned; while of 5297 whose measurements are given, 1771, or one-third, are from five to six feet deep,—2324 are from four to five feet, and 1202 from three to four feet below the level of the street: 5273, or more than five-sixths, have no windows to the front; and 2429, or about 44 per cent., are reported as being either damp or wet.

The streets inhabited chiefly by the working classes are on an average perhaps about eight yards in width; they seldom exceed ten, and are sometimes not more than five yards across. Each house is usually occupied by two or more families, exclusive of the cellar; and most of the densely peopled lodging-houses are situated in the streets. As a general rule, the houses have no thorough draught, being frequently built up against the houses in the courts behind.

Such being the vicious construction of the dwellings themselves in point of ventilation, let us next see what means their numerous inhabitants possess to dispose of the large amount of refuse organic matter necessarily eliminated, in such a way as to prevent its contaminating the atmosphere. In other words, is the supply of privies and ash-pits, and the state of the drainage and sewerage, adequate to the wants of a population whose solid excretions alone (exclusive of all other refuse matter) must amount to between two

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* Possibly, casual lodgers have been omitted in the enumeration.

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and three hundred thousand pounds weekly, or nearly six thousand tons annually.

With regard to the first branch of this inquiry, it may be stated at once that the whole of the cellar population of the parish (upwards of 20,000) are absolutely without any place of deposit for their refuse matter. Of the front houses inhabited by the working classes, a large proportion are in a similar predicament. I am unable, on this subject, to give statistical data applying to the entire parish, but from an investigation made by the Watch and Scavengers' Committee, two or three years ago, I am enabled to state that in 26 streets of the description referred to, situated between Scotland-road and Vauxhall-road, and containing about 1200 front houses, not less than 804, or two-thirds, were without either yard, privy, or ash-pit. Although the courts are better supplied in this respect, it may be doubted whether, on the whole, their inhabitants derive any advantage from the circumstance. In each of the larger courts there are usually two privies, with an ash-pit between them, situated within three or four feet of the doors and windows of the houses at the upper end, and which are the common property of all the houses in the court. These offices are often in such an abominably filthy and ruinous condition as to make it a matter of wonder, how they can possibly be used; the ash-pits are entirely uncovered, and the door of the privy is sometimes absent, having been broken, or become dilapidated from age. In many instances the inhabitants of the front houses and cellars make use of the conveniences in the courts, so that the ash-pits generally become full to overflowing, long before the nightmen make their appearance to empty them. The consequence is that the filth, which would otherwise find its way into these receptacles, is deposited in the corners of the court, in the entries or back passages adjoining it, or in the street itself. The street inhabitants who have no offices of their own, and who do not or cannot make use of the courts, are driven to deposit in like manner their refuse in the streets or entries; so that, in addition to the privies and ash-pits themselves, a large surface of the ground within and about these ill-ventilated courts and dwellings is constantly polluting the atmosphere with its noxious effluvia.

Where there are means of carrying off even the fluid portion of this superfluity of filth, the mischief would be lessened, as the noxious ingredients would less readily mingle with the air; but no such facility exists, for I do not know of a single court in Liverpool which communicates with the street or sewer by a covered drain. The fluid contents, therefore, of the overcharged ash-pits too frequently find their way through the mouldering walls which confine them, and spread a layer of abomination over the entire surface of the court. In some instances it even oozes through into the neighbouring cellars, filling them with its pestilential vapours, and rendering it necessary to dig wells to receive it, in order to prevent the inhabitants being inundated. One of these wells, four feet deep, filled with this stinking fluid, was found in one cellar under the bed where the family slept. I may mention also an instance of a cellar belonging to a cowkeeper not inhabited, but used as a dairy—where milk was kept—and which, from the absence of drains and sewers, was filled with the poisonous fluid in question, and the air of the apartment rendered unfit to breathe.

But, even supposing the courts to be properly supplied with drains, these would at present be comparatively useless, from the absence of sewers in the front streets with which they could communicate; for it would of course be out of the question to allow them to discharge their contents into the open street. Within the last twelve years much has been done to improve the sewerage of the parish, more than 100,000*l.* having been expended under a local Act in the formation of sewers; but these have been principally main sewers in the leading streets, and a very small proportion of the bye-streets inhabited by the working classes have as yet participated in the benefit of the Act. I know not whether it is the intention of the Commissioners to extend their patronage to these streets, nor indeed whether they have the power to do so; although, from the fact of some of them being sewered, I infer that the legal power, at all events, is not wanting to sewer the whole. It can be no matter of doubt that the power ought to exist somewhere, and that it should be exercised as speedily as possible. It is far from my wish to cast any reflections on the Commissioners of Sewers, who, I am sure, have endeavoured to carry out the provisions of the Act in the way which they deemed most beneficial to the town. In my entire ignorance of their powers, their means, and their plans, it would not become me to express any doubt as to the wisdom of what has been already executed under their direction. No doubt main sewers must be laid down before branches can be formed; and it can only be looked on as unfortunate that in the poor streets which are as yet nearly destitute of sewers, the necessity for them is much more urgent than in the wider streets where the main sewers have been almost exclusively laid down.

With the assistance of the map published not long ago by the Commissioners of Sewers, I have made a rough estimate of the length of the sewers formed under their direction in the inhabited streets of Liverpool. The number of inhabited streets in the parish I estimate at 566, measuring 101,290 yards, or about 57½ miles; of which 235, measuring 25¼ miles, are either wholly or partially sewered. But these 25¼ miles are very unequally divided among the different classes of the inhabitants; for while of 243 streets, measuring about 20 miles, inhabited chiefly by the working population, only 56, measuring about four miles, are sewered, the proportion of sewerage in the streets chiefly occupied by other classes of society, is 179 streets, measuring about 21¼ miles, out of 323, measuring 37½ miles.

TABLE 6.

Description of Streets.	Total.		Sewered.	
	Streets.	Miles.	Streets.	Miles.
Inhabited by Working classes	243	20	56	4
" by other classes	323	37½	179	21½
Total	566	57½	235	25½

The next element of mortality (and I believe one of the most important) to which I have to direct attention, is the unusual density of the population of Liverpool. It was, of course, to be expected that the evils arising out of the concentration of the population would, *cæteris paribus,* be aggravated in proportion to the degree of concentration; and that this is the case with regard to Liverpool I shall presently endeavour to show, in so far as the difficulty of eliminating the effect of a single cause out of the combined effects of several will permit me to do so. The aggregate density of the population of England and Wales is in the ratio of 275 inhabitants to a square mile. The towns of course present a much higher ratio; the average density of population in the 21 principal towns included in the first table being 5045 inhabitants to a square mile—in some cases being considerably above, and in other instances below, this standard. The following table, giving the ratio of density in five of our most populous towns, shows that Liverpool, in this respect also, enjoys its usual bad pre-eminence:—

TABLE 7.

Towns.	Inhabitants to Square Mile.	
	Total Area.	Builded Area.
Leeds	20,892	87,256
Metropolis	27,423	50,000 ?
Birmingham	33,669	40,000 ?
Manchester (Township) . . .	83,224	100,000 ?
Liverpool (Parish)	100,899	138,224

I am not in possession of information enabling me to fill up the second column of this table accurately, in so far as relates to London, Birmingham, and Manchester; but with regard to the two latter, it is not probable that they contain within their boundaries any considerable extent of unbuilded area; and if we assign 40,000 inhabitants to Birmingham and 100,000 to Manchester for each square mile of builded area, we can hardly have underrated the density of their population. The metropolis, including as it does an extensive range of outskirt, must have a larger allowance made for the open area within its limits, so that the population on its builded area would probably not be less than 50,000 per square mile. Should this estimate approximate to the truth, the towns would stand, in reference to the density of population on their builded areas, nearly in the order of their relative mortality (see Table 3, p. 125), viz., Birmingham, 40; London, 50; Leeds, 87; Manchester, 100; Liverpool, 138. Particular portions of all these towns are much more densely peopled than the average here given; but it may be doubted whether any English town could afford examples of a greater concentration of the inhabitants than exists in one or two localities in Liverpool. In a paper published about three years ago in a periodical journal, it is stated that "in some of the most populated parts of Liverpool the rate is so high as 83,262 per square mile;" and Mr. Farr, in noticing the extraordinary density of population in a small portion of London (East and West London Unions), where there are nearly 243,000 inhabitants to a geographical square mile, states that this is "the greatest density attained in the heart of English cities." I shall, however, mention, by and bye, a district of Liverpool containing about 12,000 inhabitants crowded together on a surface of 105,000 square yards, which gives a ratio of 460,000 inhabitants to the geographical square mile; and if we confine the calculation to a smaller portion of this district, but still comprising a population of nearly 8000 (on 49,000 square yards), we shall find the inhabitants packed together in the proportion of 457,963 to the geographical square mile, being nearly 2¾ times the maximum density of London, as stated by Mr. Farr. The most densely populated ward of Leeds, the only other town with regard to which I possess the means of comparison as to maximum density, gives a rate of only 193,500 inhabitants per geographical square mile on its builded area.

With regard to individual dwellings, it is in the "lodging-houses"—usually situated in the front streets, but sometimes in the courts—that the overcrowding of inmates is carried to the highest pitch. The worst description of houses of this kind are kept by Irishmen, and they are resorted to by the migratory Irish, among others, who may, perhaps, not remain more than a night or two in the town, as well as by vagrants and vagabonds of all descriptions. In every room of such houses, with the exception of the kitchen or cooking-room, the floor is usually covered with bedsteads, each of which receives, at night, as many human beings as can be crowded into it; and this, too, often without distinction of sex or regard to decency. But there are cellars, usually the double cellars I have described, which are used for the same purpose; and here the overcrowding is carried still further, if that be possible, and is certainly even more prejudicial to the health of the inmates, from the still more defective ventilation of these dark and miserable abodes. At night the floor of these cellars—often the bare earth—is covered with straw, and there the lodgers—all who can afford to pay a penny for the accommodation—arrange themselves as best they may, until scarcely a single available inch of space is left unoccupied. In this way as many as 30 human beings or more

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are sometimes packed together underground, each inhaling the poison which his neighbour generates, and presenting a picture in miniature of the Black Hole of Calcutta. Each individual, in the course of the night, vitiates about 300 cubic feet of atmospheric air, rendering it quite unfit for the purposes of respiration; and if we suppose 30 pair of lungs engaged in this process, we shall have 9000 cubic feet of air rendered noxious during the period of sleep. But the cubic contents of the cellars in question do not, on the most liberal computation, exceed above 2100 feet; which is the same thing as to say that 30 individuals are furnished with a supply of air sufficient for the wants of only seven. The Inspectors of Prisons in England recommend "not less than 1000 cubic feet" for every prisoner "as being essential to health and ventilation;" and yet here we have free agents voluntarily immuring themselves within a space which limits them to a supply of 70 feet, or less than one-fourth of the minimum necessary for the purposes of healthy respiration. I speak, of course, with reference to the imperfect natural ventilation of the cellars, aided, as this source of mischief is, by the pains taken to exclude even a breath of air from without. I have described an extreme case, but it is one which every medical man who has practised extensively among the poor must have had an opportunity of witnessing; and I believe it may be said, without fear of contradiction, that there is scarcely a "lodging" house or cellar in the town whose inmates are not, as a general rule, too numerous for the breathing space afforded them. The natural consequences follow:—Fever breaks out from time to time, and spreads with rapidity among the inhabitants. Nor is this the worst; for, from the migrant character of their population, these dens become foci which radiate infection not only throughout the town, but to other towns, and to distant parts of the country. But the evil of overcrowding is not confined to the lodging-houses. The houses, both in streets and courts, are very generally sub-let, each room being sometimes occuped by one or more families; so that it is not uncommon to see an apartment 10 or 12 feet square, and, perhaps still more frequently, a cellar of the same dimensions, inhabited by 12 or 14 human beings, giving a ratio of condensation in the case of the cellar (which is lower in the roof) very nearly as high as in the case of the worst lodging-cellars just noticed. In some districts of the town, inhabited chiefly by the lower Irish, whole courts and streets are densely crowded. Some instances of the latter will be afterwards mentioned; at present I shall only notice a filthy, pent-up court (in Crosbie-street), containing 118 inhabitants on an area of 150 square yards, or about 1¼ square yards to each. The average breathing-room during the night for the entire population of the court would be little more than one-half of what it ought to be, supposing the inhabitants succeeded in their attempts to prevent the admission of fresh air to the houses. In this court 50 cases of fever (nearly one-half of the entire number of inhabitants) were attended by the dispensary in a single year, besides a considerable number of patients with other diseases.

By the last Census the number of inhabited houses in Liverpool was 32,079, which gives an average of very nearly seven inhabitants to each house. The average of the court just mentioned (by no means the worst that could be adduced) is 15 inhabitants per house; and there are some entire streets of small houses where the average, including both front and back houses, is nearly as high.

Now all the conditions which I have mentioned, viz., the vicious construction of the dwellings, the insufficient supply of out-offices and of receptacles for refuse and excrementitious matter, the absence of drains, the deficient sewerage, and the overcrowding of the population, tend in the same way to increase the mortality of Liverpool, *i. e.*, by contaminating the air which its inhabitants are compelled to breathe. If it is considered that each individual requires a daily supply of upwards of 600 cubic feet of pure air to maintain the healthy composition of his blood, there will be no difficulty in understanding why, if 600 cubic feet of tainted air be supplied to him instead, and that not for one day only or occasionally, but constantly and habitually, the chance, or rather the certainty, is, that he must die before his time. But if we are asked to point out more explicitly the *modus operandi* of these causes in increasing the mortality of Liverpool, we reply that they act partly by inducing a specific disease, and partly by deteriorating the general health of the inhabitants in such a way, as to render them more prone to the attacks of nearly all diseases, but more particularly of the specific disease alluded to, and also of those organs which feel the first brunt of the poison, *i. e.*, the organs of respiration.

The disease I refer to is fever,—the common fever of this country, which may be taken as a generic term, including the varieties known as typhus, synochus, low adynamic fever, brain fever, nervous fever, &c., and which I shall presently show to be the characteristic disease of the poor of Liverpool. With regard to one, at least, of the conditions noticed, *i. e.*, the congregation of the inhabitants within small and pent-up areas, where the means of ventilation are denied, (and where, as I formerly observed, the atmosphere is vitiated, not by their respiration only but by the poisonous emanations which arise from their bodies,) there can be little doubt as to its being an efficient cause of fever, the fact being established by the concurrent testimony of nearly every medical writer of repute. The operation of this cause, in its highest intensity, is shown in the case of the Black Hole of Calcutta, where, out of 146 human beings who were confined within a space of about 5000 cubic feet, not more than 23 survived the night, and these "were said to have been afterwards attacked with a fever analogous to typhus." The same cause, acting in a less concentrated form, produces the same

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effects, more slowly, it is true, but not the less surely, in the "black holes,"—the crowded courts, and cellars, and lodging-houses,—with which Liverpool abounds. I could give many examples in proof of this were it not a matter so notoriously admitted, both in theory and in fact, that it would be a needless occupation of your time to do so. One or two instances are mentioned in my Report to the Poor Law Commissioners on the sanatory condition of Liverpool, in which are also introduced some other particulars and illustrations of the subject, which I have therefore abstained from repeating here. Formerly,—before attention was paid to ventilation in the construction of our public buildings destined for the reception of large numbers of inmates,—fever was never absent from our crowded gaols, and hospitals, and barracks; while our transport ships seldom made a voyage without losing a considerable proportion of the troops, from the same disease. So much was this the case, that the disease obtained a specific name from the circumstance,—"gaol fever," "hospital fever," "ship fever," "camp fever," being terms constantly met with in medical writings. Even where the individuals who generate the poison remain free from its effects, they may communicate the fever to others, as was the case in what is known, from that circumstance, as the Black Assize at Oxford in 1577, where the Lord Chief Baron, the sheriff, and about 300 more, (all who were present in the Court,) were infected by the prisoners, and died within 40 hours; and also in the famous Old Bailey session of May, 1750, in which most of those present who occupied one side of the Court, (including the Lord Mayor, two of the judges, and one of the aldermen on the bench,) so as to receive the emanations from the prisoners' bodies, contracted fatal typhus.

As illustrating the effect of overcrowding in the wards of hospitals, it will be sufficient to quote the experience of the late Mr. Pearson, a surgeon of eminence, attached to the Lock Hospital in London, who "uniformly observed, when more than a certain number of patients were placed in any of the wards, fever became prevalent in the establishment; and from repeated observation of this fact, he was induced to restrict the number of beds in each ward, and never afterwards witnessed the recurrence of fever in the house."

It is still a disputed question among the medical profession, whether the malaria arising from the accumulation of filth from decomposing animal and vegetable matter, such as the contents of ash-pits and cesspools,—is sufficient in itself to generate fever. Although there are numerous recorded instances in favour of the affirmative, and many high authorities support that side of the question, I am myself inclined to doubt whether this is an efficient cause of fever, independently of other circumstances. But there is no difference of opinion as to the most important point in this inquiry, *i.e.*, as to the fact of these exhalations favouring, in the highest degree, the extension of the disease when it has once ap-

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peared in a locality where they abound. It is admitted on all hands that, although this condition may not suffice to originate fever, it invariably promotes its rapid extension.

As to the influence of deficient ventilation, I may refer to the comparative absence of fever in our prisons, and workhouses, and hospitals, since the proper principles of construction have been better understood; as well as to the improvement, in this respect, in certain situations in large towns, where densely-peopled localities have been opened up, and streets carried through them so as to admit a freer circulation of air. I may mention one instance of this kind in Liverpool,—St. Andrew-street,—through which a pretty wide street was carried, some years ago, with the effect of diminishing, to a considerable extent, the number of fever cases occurring there. Doctors Barker and Cheyne, in their History of the Fever Epidemic in Ireland, in 1817-18, state a remarkable instance of a ward in St. Patrick Dun's Hospital, by the peculiarity of its construction—affording unusual facilities for ventilation—protecting the attendants upon the sick from the effects of contagion. When the hospital, "by agreement with Government, contained 100 patients in fever, the male ward (the one in question) was crowded, containing 44 patients, yet only one nurse was affected with fever; at the same period, the nurses in attendance on the female patients, who were certainly not so much crowded together, were continually taking the complaint, and generally had it with severity." On this subject I shall merely add an example to the same effect, mentioned by Mr. Chadwick in his Report on the Sanatory Condition of the Labouring Classes in Great Britain. He says there is in Glasgow, attached to one of the factories, "an assemblage of dwellings for their work-people, called, from its mode of construction and the crowd collected in it, the Barracks. This building contained 500 persons; every room contained one family. The consequences of this crowding of the apartments, which were badly ventilated, and the filth, were, that fever was scarcely ever absent from the building. There were sometimes as many as seven cases in one day, and in the last two months of 1831, there were 57 cases in the building. All attempts to induce the inmates to ventilate their rooms were ineffectual, and the proprietors of the work, on the recommendation of Mr. Fleming, a surgeon of the district, fixed a simple tin tube of two inches in diameter into the ceiling of each room, and these tubes led into one general tube, the extremity of which was inserted into the chimney of the factory furnace. By the perpetual draught thus produced upon the atmosphere of each room, the inmates were compelled, whether they would or not, to breathe pure air. The effect was, that during the ensuing eight years fever was scarcely known in the place. The cost of remedies previously applied in the public hospitals to the fever cases, continually produced as described in the Barracks, was stated by Dr. Cowan to have afforded a striking contrast to the cost of the means

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of prevention." (p. 107.) It is the more airy and better ventilated condition of the dwellings of the wealthier classes which explains the fact, that when fever does happen to be introduced there by contagion, it is hardly ever known to spread; while in the badly-ventilated houses of the poor, it seldom stops with the individual first attacked. In the former case, the fever-poison is at once freely diluted and speedily carried off; in the latter case, it accumulates until the whole atmosphere of the dwelling becomes impregnated with the noxious virus.

The causes I have mentioned are in operation, more or less, in almost every town, and if it be true that they are influential in the production or extension of fever, we should expect to find that disease more prevalent in towns generally than in the country, where the effluvial gases are more at liberty to follow the bent of their nature, and diffuse themselves through the circumambient atmosphere with velocities inversely proportioned to the square roots of their densities. And this we find to be the case. Comparing the number of deaths from fever in two years, in the towns and in the country districts comprised in the first table, we find there were 10,930 in the former, and only 6,515 in the latter; the proportion being about 168 in the towns to 100 in the country districts, (which include, however, a number of towns of inferior magnitude). Further, if it be true that these causes act with greater energy in Liverpool than elsewhere, their effect or fever ought also to appear in a greater ratio; and this, too, we find to be the case. Previously to the publication of the Reports of the Registrar-General, I stated my belief, founded chiefly on the Records of dispensary practice, that 1 in 25 of the working population of Liverpool was annually affected with fever, and that this probably afforded a higher ratio than any other town in England. This estimate is confirmed by the following table, showing the number of deaths from fever, in the five principal towns of England, during the whole period (3½ years) comprised in the Registrar-General's published Reports:—

TABLE 8.

Towns.	Deaths by Fever.*	Total Deaths.	Per Centage Proportion of Fever Deaths to others.	Proportion of Fever Deaths to Population Annually.
Birmingham . . .	502	12,224	4·10	1 in 917
Leeds (Parliamentary Borough).	661	14,747	4·48	,, 849
Metropolis	9,150	189,379	4·83	,, 690
Manchester (three years)	1,121	19,969	5·61	,, 498
Liverpool and West Derby.	2,060	33,022	6·23	,, 488
Liverpool (Parish) . .	1,795†	26,456	6·78	,, 407

* Exclusive of scarlet fever and the exanthemata.

† This gives 513 yearly for the parish alone; and as the mortality of fever in Liverpool is not more than 1 in 12 or 15 cases, 513 deaths will represent about 7000 cases of fever, which, multiplied by 25, will yield more than the estimated number of the working population.

Liverpool and West Derby include a rural population of about 25,000 beyond that of the municipal borough, but notwithstanding this, it presents a larger proportion of deaths from fever than any other town, not only as compared with the population but with the total number of deaths from all causes. In the parish of Liverpool, the proportions are as high as 1 in 407 of the population annually, and 6·78 per cent. of the total deaths,—while the proportion in the more thinly-peopled and better-ventilated suburbs is only 1 in 1037 of the population, and 4·03 per cent. of the total deaths.

But the operation of these physical causes is not confined to the generation or extension of fever. When acting with a less degree of intensity, there may still be sufficient to affect the general health; and, in fact, they do deteriorate the health of those exposed to their influence, and call into action the latent germs of other diseases. It would be a waste of time to point out the way in which the general health is injured by the habitual respiration of contaminated air, but there are one or two diseases whose existence seems specially favoured by this circumstance, and to these alone I shall call your attention. The first I shall notice is consumption.

It seems natural to expect that the organs with which the foreign gaseous ingredients of the atmosphere come more immediately into contact, and whose blood-vessels they must enter on their passage into the system, should feel in a distinctive manner their noxious influence; and this *à priori* expectation is strengthened by observation both in man and animals, as well as by experiment on the latter. It has been observed that where individuals breathe, habitually, impure air, and are exposed to the other debilitating causes which must always influence, more or less, the inhabitants of dark, filthy, and ill-ventilated dwellings, scrofula—and consumption, as one of its forms—is very apt to be engendered, even where the hereditary predisposition to the disease may be absent. Professor Alison, one of the highest authorities on this subject, remarks:—"It is hardly possible to observe separately the effect on the animal economy of deficiency of exercise and deficiency of fresh air, these two causes being very generally applied together, and often in connexion with imperfect nourishment. But it is perfectly ascertained, on an extensive scale, in regard to the inhabitants of large and crowded cities, as compared with the rural population of the same climate,—first, that their mortality is very much greater, especially in early life, and the probability of life very much less; and, secondly, that of this great early mortality in large towns, a very large proportion is caused by scrofulous disease. And from these two facts it evidently follows, that deficiency of fresh air and of exercise are among the most powerful and the most important, because often the most remediable, of the causes from which the scrofulous diathesis arises."[*] Sir James

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[*] Outlines of Pathology and Practice of Medicine, p. 194.

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Clark, who has written the best monograph on consumption in our language, regards "the respiration of a deteriorated atmosphere as one of the most powerful causes of tuberculous cachexia," (*i. e.*, the constitutional affection which precedes the appearance of consumption). He says, "If an infant born in perfect health, and of the healthiest parents, be kept in close rooms, in which free ventilation and cleanliness are neglected, a few months will often suffice to induce tuberculous cachexia." "There can be no doubt," he adds, "that the habitual respiration of the air of ill-ventilated and gloomy alleys in large towns is a powerful means of augmenting the hereditary disposition to scrofula, and even of inducing such a disposition *de novo*. Children reared in the workhouses of this country, and in similar establishments abroad, almost all become scrofulous, and this more, we believe, from the confined impure atmosphere in which they live, and the want of active exercise, than from defective nourishment."* The same distinguished physician has actually succeeded in inducing consumption in rabbits, by confining them in a cold, dark, damp, close situation, and supplying them with innutritious food. Monkeys present the same phenomenon in this country, where they are often crowded together during the winter in a confined and heated atmosphere, and where true tubercular consumption commits more extensive ravages among them, than it does even among the human race. It is known, also, that this malady is very prevalent among the cows which supply milk to the inhabitants of some large towns, where they are immured during part of every year in dairies perfectly closed, and which, being too small for the number of animals they contain, soon become filled with heated, vitiated air, for the removal of which no proper provision is made. This is remarkably the case with the cows belonging to the milkmen of Paris, which are annually carried off by consumption in considerable numbers.† A confirmation of the influence of this cause is afforded by the exemption of the horse from consumption, although frequently placed in the same circumstances with the cows, but with intervals of exposure to fresh air and the enjoyment of exercise. Where a number of horses, however, are collected together in ill-ventilated stables, they may become consumptive. Mr. Chadwick says, that a discovery of this kind "was only lately made as to the effect of defective ventilation on the cavalry horses, in some of the Government barracks in England; and it is stated that a saving of several thousand pounds per annum was effected by an easy improvement of the ventilation of the barracks near the metropolis." (p. 104.)

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* Cyclop. of Pract. Medicine, iv. 320.

† Rapport à M. le Préfet de Police, sur la Pommelière ou Phthisie Pulmonaire des Vaches Laitières de Paris et des Environs; in Annales d'Hygiène, xi. 447. The Reporter says,—"The only measure which the administration can take to diminish the evil, is to direct the keepers to provide very wide and very lofty stables for their cows, in order that they may contain the quantity of air necessary for the respiration of the animals during a long space of time." (p. 453.)

Before stating the proportion of deaths from consumption in Liverpool, it will be proper to say a few words as to the nature of the effluvia arising from privies, cesspools, &c. The principal gas given out from these deposits is sulphuretted hydrogen, the most deadly of the gaseous poisons, two or three cubic inches causing instant death when injected into a vein, or into the chest, or beneath the skin of animals. A rabbit died in ten minutes after being enclosed in a bag containing sulphuretted hydrogen, although its head was left free so as to allow it to breathe the pure atmosphere. Nine quarts injected into the intestines of a horse, as a common clyster, killed it in a minute; and I have heard it stated that it is difficult to keep horses in high condition in the immediate neighbourhood of large privies, where sulphuretted hydrogen is abundantly given out. Even when largely diluted with atmospheric air, it retains, in a great degree, its noxious properties. A dog was killed by being made to breathe a mixture of 1 part of this gas with 800 parts of common air; and air containing only 1-1500th part of sulphuretted hydrogen proves speedily fatal to small birds. If the principal ingredient of these emanations is capable of exerting such destructive agency, we should expect it to have shown its effects occasionally on the men employed in clearing out the places where it accumulates. Various instances of this kind are on record, in some of which immediate death followed the incautious inhalation of the effluvia in a concentrated form; and in others, where the gases were more diluted, the persons breathing them became faint, delirious, and insensible, or were attacked with convulsions, even where they ultimately recovered. The most remarkable examples of this kind have occurred in France, where the contents of the *Fosses d'aisance* are allowed to accumulate for a long period; but it is not a great many years since four men fell victims to the poison while engaged in clearing out a privy near Brompton; and still more recently an accident of a similar nature happened at Clapham.—Twenty-three children, belonging to a boarding-school at that place, were simultaneously attacked with violent irritation of the stomach and bowels, convulsive twitchings of the muscles, and excessive prostration of strength; and two of them died in about 24 hours. The symptoms were ascribed, by the medical attendants, to the inhalation of sulphuretted hydrogen from the contents of a foul cesspit, which had been scattered over a garden adjoining the children's play-ground. Although these effluvia are breathed by the inhabitants of our courts and back streets in a state, of course, of extreme dilution, we cannot suppose that they are on that account entirely harmless. What, in a concentrated form, is so very deadly, must, in a diluted state, be injurious to health.

The influence of this and of the other unfavourable conditions of the residences of the working classes will, of course, be felt most readily and most severely by those of feeble constitutions, where

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the powers of nature are unable to wage an unequal war with such a numerous cohort of morbific agencies. Infancy, in particular, will fall an easy victim. The records of foundling-hospitals, workhouses, and other public institutions abundantly show the especially injurious influence of impure air during the periods of infancy and childhood. One way in which it increases the mortality of infants is by inducing convulsions, in consequence of the peculiar irritability of the nervous system at that age. In a paper read before the Medical Section of the British Association, in 1834, it was stated, on the authority of the Registrar of the Lying-in-Hospital of Dublin, that in 1781, owing to the impurity of the air in the wards, "every sixth child died within nine days after birth, of convulsive disease; and that after means of thorough ventilation had been adopted, the mortality of infants in the five succeeding years was reduced to nearly one in twenty." Dr. Andrew Combe, in his Treatise on the Management of Infancy, quotes an equally striking instance from Mr. Maclean's account of his visit to St. Kilda in 1838. "After remarking that the population of St. Kilda is diminishing rather than increasing, Mr. Maclean states that this unusual result is partly owing to the prevalence of epidemics, but chiefly to the excessive mortality which is at all times going on in infancy. 'Eight out of every ten children,' he says, 'die between the 8th and 12th days of their existence!' On perusing this statement, the reader will naturally be disposed to wonder what poisonous quality can infect the air or soil of St. Kilda, to cause such a tremendous destruction of life, and will infer that here, at least, there must be some powerfully deleterious influence at work, which human means cannot successfully cope with. So far, however, from this being the case, Mr. Maclean expressly states, that 'the air of the island is good, and the water excellent;' that 'there is no visible defect on the part of Nature;' and that, on the contrary, 'the great, if not the only, cause is the filth amidst which they live, and the noxious effluvia which pervades their houses.' In proof of this, he refers to 'the clergyman, who lives exactly as those around him do in every respect, except as regards the condition of his house, and who has a family of four children, the whole of whom are well and healthy;' whereas, according to the average mortality around him, at least three out of the four would have been dead within the first fortnight. When it is added, that the huts of the natives are small, low-roofed, and without windows, and are used, during winter, as stores for the collection of manure, which is carefully laid out upon the floor and trodden under foot till it accumulates to the depth of several feet, the reader will not hesitate to concur in opinion with Mr. Maclean, and admit that had the clergyman's children been subjected to the same mismanagement as those of the other islanders, the probability is, that not one of them would have survived." (p. 15). A passage to the same effect may be quoted from Mr. Chadwick's

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Report. Speaking of workhouses, schools, &c., he says, (p. 119):—"Since the attention of medical men has been sufficiently directed to the subject, the explanation has become complete of many deplorable cases of general ill health and mortality in such places, attributed at first to deficiency or bad quality of food, or to any cause but the true one,—want of ventilation. A striking illustration of this was afforded in the case of a large school for children during the years 1836 and 1837, as recorded in the second volume of the Poor Law Reports. Such general failure of health, and such mortality, had occurred among the children as to attract public notice, and the animadversions of many medical men and others who visited the schools; but by most the evil was attributed chiefly to faulty nourishment; and it was only after the more complete examination made by the direction of the Board, that the diet was found to be unusually good, but the ventilation very imperfect. Suitable changes were then made; and now, in the same space where 700 children were by illness awakening extensive sympathy, 1100 now enjoy excellent health."

I have already shown the high ratio of infantile mortality in towns generally, and pointed out the fact that Liverpool, in this respect, surpasses all our English towns; 53 out of every 100 children born dying before the completion of their fifth year.—(See Table 4, p. 125.) The following table shows the proportionate number of deaths from consumption, and from convulsions, in Liverpool and in the four other largest towns in England, during the three years 1838-39-40:—

TABLE 9.

Towns.	Total Deaths (3 Years).	Deaths by Consumption.	Proportion of Deaths from Consumption to		Deaths by Convulsions and Teething.	Proportion to	
			Total Deaths.	Population Annually.		Total Deaths.	Population Annually.
			Per Cent.	1 in		Per Cent.	1 in
Birmingham	10,765	1,910	17·74	207	616	5·72	645
Metropolis .	164,420	22,027	13·39	246	11,993	7·29	453
Leeds . .	13,165	2,316	17·59	209	1,612	12·24	301
Manchester	19,969	3,256	16·30	172	2,735	13·69	205
Liverpool .	22,532	4,043	17·94	156	3,365	14·93	188

In the column of convulsions I have included the deaths from teething (710 out of the 3365 in Liverpool), because "teething very generally causes death by convulsions; and the disease in that case might be registered under either title; and because the predisposing cause of death in both cases is the same, *i. e.*, excessive irritability of the nervous system. The numbers in this column embrace children, or rather infants, almost exclusively, 822 out of 869 deaths in one year from convulsions alone, in the parish of Liverpool, having occurred within the first twelvemonth after birth. It will be observed that, in this division of the table, the different towns maintain their accustomed positions; the mortality gradually rising from 5¾ per cent. of the total deaths, and 1 in 645 of the population in Birmingham to 15 per cent. of the deaths. and 1 in 188 of the population in Liverpool. Among the 88,000 individuals breathing the purer air of the surrounding district of West Derby (including, however, Toxteth Park, Edge Hill, &c.), the deaths from this cause are only 1 in 334.

In the first division of the table (consumption) the usual order is somewhat departed from, Birmingham giving precedence to London and Leeds, and ranking next to Manchester in point of absolute mortality from this disease, and next to Liverpool as regards relative mortality, *i. e.*, the proportion of the total deaths caused by consumption. Liverpool occupies its usual position at the foot of the table. In London, the mortality from consumption is 13⅓ per cent. of the total mortality, and 1 in 246 of the population; in Liverpool and West Derby it is nearly 18 per cent. of the deaths, and 1 in 156 of the population annually.

The seeming anomaly with regard to Birmingham, so startling at first sight, may be explained, in a great measure, by the nature of the occupations in which so large a number of the working classes in that town are engaged. Of these, the process of "dry grinding," especially needle-pointing, may be mentioned as being particularly apt to induce consumption, from the inhalation of the metallic particles projected into the air. The Committee of Physicians and Surgeons who reported on the sanatory state of Birmingham, mention also "the dusty employments of pearl button-making and of the brass-foundry as producing detrimental effects on the air-passages. The process of lackering metals they believe also to be very unhealthy. This proceeding is carried on in hot rooms, the atmosphere of which is extremely impure, generally by young females, great numbers of whom become the victims of consumption," p. 216. Were the comparison between Liverpool and Birmingham in this respect confined to females, comparatively few of whom are engaged in these unhealthy processes, the result would be much more favourable to the latter town; for, if we contrast the proportionate numbers of male and female deaths respectively, from consumption, to the total male and female deaths in the two towns, we shall find that in Liverpool the proportion of females to males is as 992½ to 1000, while in Birmingham it is as low as 919 to 1000. So, in a paper published in one of the journals, about three years ago, and written, I believe, by Mr. Farr, it is stated that the proportion of deaths of females from consumption was, "for England and Wales, 1 in 431; for the Metropolis, 1 in 464; for Birmingham, 1 in 404; for Manchester, 1 in 392; and for Liverpool, 1 in 298, of the female inhabitants; giving an advantage of nearly 56 per cent. in favour of London over Liverpool." It is probable that the deaths from this disease in London are somewhat diminished by the large proportion of the wealthier classes among its inhabitants, whose means enable them to avail themselves of the chance of recovery afforded by removal to a milder climate. It has been

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supposed that consumption is particularly prevalent among the factory population; but this idea seems to be discountenanced by the fact of the lower ratio of this disease in Leeds and in Manchester than in Liverpool, where we have only one solitary mill. At all events, whatever influence the absence of this cause may exert, it is more than counterbalanced by the influence of other causes which are unfortunately present and in active operation.

If the conditions noticed in the former part of this paper really contribute to the high rate of mortality in Liverpool, we ought to find other large towns (whose rate of mortality is lower) better situated in those respects; and there can be little doubt that such is the case. I shall contrast, in as far as I have the means of doing so, the condition of Liverpool with that of Manchester, whose mortality is the highest (excepting Liverpool), and of Birmingham, whose mortality is the lowest, of all the large provincial towns in England. A perusal of the evidence taken by the Select Committee on the Health of Towns will satisfy any one that, in Liverpool and Manchester, which are the most unhealthy towns in the kingdom, the state of the dwellings of the working classes is also worse than in any other town in England; but that, in this respect, as well as in point of mortality, Liverpool is still lower in the scale than Manchester.

In the first place, Liverpool appears to have a larger amount of cellar population than any other town. After a careful investigation of the cellar residences, both here and in Manchester, by the Statistical Society of the latter town, about seven years ago, they estimated the proportion of the working classes inhabiting cellars in Liverpool at 20 per cent., in Manchester at 11¾ per cent., and in Salford at only 8 per cent. In Birmingham, the most healthy of all the large towns, it appears that there are no cellar residents whatever. The Committee of Physicians and Surgeons who drew up the report on the sanatory condition of that town state:—"Our inquiries have not enabled us to discover a single example of a cellar used as a dwelling in Birmingham. We have requested some vigilant officers of police to discover if, in any part of the borough, cellars are used as dwellings; and the result of their inquiries has confirmed our own observations on this point." The cellars in Manchester, while they are not so numerous as in Liverpool, seem to be at the same time less obnoxious in their construction. Mr. Riddall Wood, who examined them in both places, says, in his evidence before the Committee on the Health of Towns.—"My impression is, that they are not nearly so numerous in Manchester as in Liverpool. Bad as they are, they are of a superior description, as far as light and ventilation go." (2210.)

I have not been able to meet with any estimate of the number of individuals inhabiting courts in Manchester, but they appear to be less numerous than in Liverpool. Mr. Riddall Wood, in answer to a question (2212), "Are there many courts in Manchester?" replies, "Not so many as in Liverpool." Mr. Fletcher, secretary to

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the Hand-loom Weaver Commissioners, states, "that sort of construction is less common in Manchester than in Birmingham." (1273.) In Birmingham, a very large proportion of the labouring classes (not less than 49,016, according to the estimate of the physicians and surgeons) reside in courts, or *villages*, as they are termed by the inhabitants; but, although the older courts are described as being "for the most part narrow, filthy, ill ventilated, and badly drained," they seem, on the whole, to be superior to the courts of Liverpool. The description quoted above does not apply to the newer portion of Birmingham; and with regard even to the old town, Mr. Wood states that, in this respect, "as compared with other places, it is much superior." (2278.) But even were it otherwise, there is another point of difference which would prevent the mal-construction of the courts being productive of the same amount of mischief as in Manchester or Liverpool; *i. e.*, the much smaller number of inhabitants who are pent up within an equal space. Mr. Wood states, in answer to the question (2268), "The state of their dwellings (the humbler classes at Birmingham) is supposed to be a great deal better than that of the poorer classes at Manchester and many Lancashire towns?"—"Very much better. In the first place, I rarely met with any dwellings at Birmingham in which more than one family resided; each family had a separate dwelling, and they were not let off in flats, as they are in Manchester and Liverpool to a very great extent." And the Committee of Physicians and Surgeons say, "We cannot but believe that the comparative exemption of the inhabitants of this populous town from contagious fever may be in some measure owing, in addition to other causes, to the circumstance of almost every family having a separate house, although a large portion of these houses are situated in courts, and are built back to back," p. 196. In Manchester, Mr. Wood says, "Although a very large number of the working classes reside in houses with separate rooms in the same house, the majority reside in separate houses." (2319.) This could certainly not be said of Liverpool. In point of general density of population, it will be remembered that Liverpool considerably exceeds all other English towns, having 100,000 inhabitants to the square mile; while Manchester has only 83,000, and Birmingham not more than 33,000 to the square mile.

During the investigation made by the Special Board of Health in Manchester at the time when cholera prevailed in this country, it was discovered that of 6951 houses inspected, 2221 (or nearly one-third) were without privies, so that in this respect Manchester is probably little better off than Liverpool. Birmingham, however, seems to be more favourably situated, for Mr. Riddall Wood, in reply to the question (2287-8), "Did you take notice whether there was attention paid to the privies or cesspools, or whether they were in a neglected state?" says, "My impression was favourable in respect to Birmingham, as compared with other places."—He makes the same remark in his evidence with regard to the drainage. "Generally speaking," he says, "the streets and the drainage in Birmingham are very superior to those in Manchester and other towns in Lancashire." (2269.) "I made frequent inquiries of the inhabitants of the courts, and found much fewer complaints (as respects drainage and sewerage); that may be partly owing to its situation; it is all on inclined planes. Manchester lies on a dead level, or nearly so; of course the situation of Birmingham is better." (2279.) "I know there was under-ground drainage in all the leading streets of the town, and there were soughs lying along the sides of the streets, covered over. (2280.) In like manner the Committee of Physicians and Surgeons say, in their Report, "The present sewers are numerous and large, and the principal streets are well drained." (P. 192.) Mr. Hodgson of Birmingham, one of the witnesses examined by the Select Committee of the House of Commons, remarks that "there exists in the town a body of commissioners, possessing considerable powers with reference to the erection of buildings, the sewerage, and so on;" and "that power is extremely well exercised, and becoming more so every day." (2974-5.) In Manchester the sewerage seems to be much on a par with that in Liverpool, for although Mr. Cobden, in reply to the Select Committee, says, (1831), "In those parts of Manchester which are under the management of commissioners appointed for the purpose, I should say the streets are as well cleansed and soughed as any town can be." Mr. Wood gives a more qualified opinion. He says (2216), the state of cleansing and sewerage in Manchester is "decidedly bad; to say worse than Liverpool, would perhaps be going too far, but quite as bad." In a Report of the Commissioners of Sewers which appeared some time ago in the "Manchester Guardian," it was stated that the length of streets sewered in the township of Manchester was upwards of 22 miles, which gives a ratio to the population somewhat higher than in the case of Liverpool. I have no means of knowing the proportion of sewered streets inhabited chiefly by the working classes in Manchester or in other towns, but I have no reason to suppose that, with the exception, perhaps, of Birmingham, they are much better situated in this respect than Liverpool. The same intelligent witness whom I have so often quoted, when asked (2238) "Have you any doubt that the state of the poorer classes in those towns in these repects is the cause of a great deal of discontent?" replied, "They have frequently remarked to me, when I spoke about the drains,—that the habitations of the poor and the comforts of the poor were altogether neglected; that the parties who were commissioners, or who had the power of making alterations and drains, and improving the streets, and so on, had taken care of their own property and their own dwellings, and left the streets in which they resided almost entirely without such conveniences."

I ought to have mentioned, among the evils requiring remedy in Liverpool, the inefficient system of scavenging and cleansing in the streets inhabited by the poorer classes. The visits of the scavengers

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to these localities are, I fear, like "angels' visits" in more respects than one; none of these streets being visited oftener than once a-week, and a much longer interval frequently intervening. What the practice is in this respect in other places, I do not know; but in the Report of the Manchester Commissioners I observed it stated that during the previous year 13,000,000 of yards had been swept, and 39,000 loads of sweepings removed. This will give some idea of the quantity of refuse left to contaminate the atmosphere in the neglected districts of this and other large towns. The courts, not being under the control of the commissioners, are never favoured with the visits of the public scavenger.

Another source of mischief which ought to have been noticed previously, and which I am convinced must contribute its share to the disproportionately great mortality of childhood in Liverpool, is to be found in the state of the dame-schools and common day-schools in the poorer parts of the town. In these schools, where very little is even professed to be taught, and which are frequently held in cellars or in garrets, children are often crowded together, for two or three hours at a time, in numbers which soon render the atmosphere of these ill-ventilated apartments most oppressively close, and prejudicial to the health of the scholars,—an effect which is evidenced by their exhausted looks and languid air after having been an hour or two confined. Mr. Riddall Wood, who spent some time in Liverpool, about seven years ago, in investigating the state of education in the borough, found that there were at that time 244 dame-schools with 5240 scholars, and 194 common day-schools with 6096 scholars. In his report to the Manchester Statistical Society, he says, "The condition of most of the schools in an extensive and populous district, stretching upwards from the North Shore to Scotland Road, is wretched in the extreme, corresponding in a remarkable manner with that of the population. With few exceptions the dame-schools are dark and confined; many are damp and dirty; more than one-half of them are used as dwelling, dormitory, and school-room, accommodating in many cases a family of seven or eight persons; above 40 of them are cellars." "Of the common day-schools in the poorer districts" (he states in another part of his Report), "it is difficult to convey an adequate idea; so close and offensive is the atmosphere in many of them as to be intolerable to a person entering from the open air, more especially as the hour for quitting school approaches. The dimensions rarely exceed those of the dame-schools, while frequently the number of scholars is more than double. Bad as this is, it is much aggravated by filth and offensive odour arising from other causes."* Mr. Wood states that the masters and mistresses were generally ignorant of the depressing and unhealthy effects of the atmosphere which surrounded them, and he mentions the case of the

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* See Report of a Committee of the Manchester Statistical Society, on the State of Education in the Borough of Liverpool, in 1835-6.

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mistress of a dame-school who replied, when he pointed out this to her, that "the children thrived best in dirt"! He notices particularly a school in a garret up three pair of dark, broken stairs, with forty children in the compass of ten feet by nine; and where, "on a perch forming a triangle with the corner of the room sat a cock and two hens; under a stump-bed immediately beneath was a dog-kennel, in the occupation of three black terriers, whose barking, added to the noise of the children and the cackling of the fowls on the approach of a stranger, was almost deafening. There was only one small window, at which sat the master, obstructing three-fourths of the light it was capable of admitting." In Manchester, so far as I can judge from the Report of the Committee of the Statistical Society, the schools for the working classes, especially the day-schools, are somewhat better than those in Liverpool, although the dame-schools are described as being "deplorably bad." "Neither in Manchester nor Liverpool was there a common day or dame-school where there was a play-ground, where the children could get the change necessary for young persons." (2231.) In Birmingham, Mr. Wood stated to the Committee on the Health of Towns that, "taken as a whole, the state of the dame-schools was much better than in Liverpool and Manchester." They were small rooms, but generally on the ground floor, and not, as in Liverpool and Manchester, frequently in cellars or garrets. (2300.)

What has been already stated with regard to the high rate of mortality amongst us, and its physical causes, applied to Liverpool as a whole; but I have now to show that the mortality is distributed over the parish in very different proportions, and to point out how far any connection may be traced between the ratio of mortality in each district and the particular degree of intensity with which those physical causes may there be found to operate. The subsequent tables have been constructed with the view of facilitating the illustration of this important point. The materials from which they have been framed were derived from the enumerators' lists of the late Census, with which I was favoured by Mr. Eckersley; the returns of the Corporation Surveyors with regard to the court and cellar residences; the map published by the Commissioners of Sewers; the records of the dispensaries; and a list of the deaths in the different registrar's districts of the parish, for two years (1838 and 1842), with which I have been obligingly furnished by the superintendent registrar. The first table contains merely some of the facts from which the others have been calculated.

I have stated here the estimated population on 1st July, 1837 (as well as the population enumerated in 1841), that being the mean term of the five years, 1835-39, from which the annual average of fever is to be deduced. The court and cellar population was enumerated about six months previous to the taking of the Census, so that the proportion of inhabitants of courts and cellars in the different

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wards will be a fraction higher than the numbers here given would indicate. I have no means of stating the proportions of different diseases which have caused death in the various wards, but, as a substitute, I have given the number of patients with fever,—one of the principal diseases of the poor,—attended at their own houses by the officers of the North and South Dispensaries, during the five years from 1835 to 1839 inclusive.

TABLE 10.

Wards.	Population 1841.	Population Resident (1840) in			Fever Cases, 5 Years. 1835—39.	Population, July 1, 1837.
		Courts.	Cellars.	Courts and Cellars.		
Vauxhall .	*26,146	11,585	3,253	14,838	4,346	23,849
St. Paul's .	18,002	5,209	1,931	7,190	1,615	16,766
Exchange .	17,769	3,975	2,491	6,466	2,955	15,493
Castle-street .	9,691	1,829	570	2,399	955	9,168
St. Anne's .	18,882	5,588	1,983	7,571	1,078	17,136
Lime-street .	18,848	4,079	900	4,979	480	17,514
Scotland . .	35,613	10,628	3,166	13,794	1,867	28,729
St. Peter's .	9,533	1,589	499	2,088	673	9,394
Pitt-street .	15,263	1,742	2,103	3,845	1,108	14,166
Great George	19,645	4,590	1,337	5,927	1,863	17,700
Rodney Street	15,202	2,567	903	3,470	265	12,491
Abercromby .	†15,899	2,153	982	3,135	264	12,651
	220,493	55,534	20,168	75,702	17,469	195,057

The next table shows the per centage of the population of the different districts who are resident in courts and cellars, with the proportion of the entire population of each district annually attended with fever by the dispensaries, and the annual rate of mortality from all causes in each of the corresponding districts, in the years 1838 and 1842.

TABLE 11.

Wards.	Per Centage of Population in			Fever Cases to total Ward Population Annually.	Total Deaths. Average of Two Years.
	Courts.	Cellars.	Courts and Cellars.		
Vauxhall	45·44	12·76	58·20	1 in 27·44	1 in 23·50
St. Paul's . . . . Exchange . . . . Castle Street . . .	24·74	11·33	36·07	37·66	30·67
St. Peter's . . . . Pitt-street . . . . Great George . . .	18·10	9·00	27·10	56·51	31·36
St. Anne's. . . . Lime Street . . .	26·22	7·83	34·05	109·30	31·51
Scotland	31·28	9·32	40·60	77·02	31·74
Rodney-street . . . Abercromby . . .	15·98	6·38	22·36	237·18	41·62

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* Exclusive of Northern Hospital (80), but including Borough Gaol (536), and Night Asylum (110).

† Exclusive of Workhouse (1643), and Infirmary, &c. (320).

In stating the deaths, I have been obliged to group together several of the wards, as the registration returns do not show the deaths for each ward separately, but merely for the different registrar's districts into which the parish is divided, and which, excepting in two instances, include more than one ward.

It will be observed that Vauxhall Ward, where the largest proportion—more than one-half—of the population reside in courts or cellars, is also the ward in which fever is most prevalent, 1 in 27 of the inhabitants having been annually attended by the dispensaries alone; while in Rodney-street and Abercromby Wards, where this disease prevails the least (only 1 in 237 of the inhabitants having been attended), there is also the smallest proportion of the population—between one-fourth and one-fifth—resident in courts and cellars. The same connection will be found to subsist between the proportion of court and cellar population and the prevalence of fever in the other districts, with the exception of Scotland Ward and St. Anne's and Lime-street Wards, where the cases of fever are considerably below the ratio of the court and cellar population. Nearly the same remarks apply to the rate of mortality in the different districts, 1 in 23½ of the inhabitants of Vauxhall Ward dying annually, while in Rodney-street and Abercromby Wards the proportion is only 1 in 41¼. Scotland Ward is again an exception, standing next to Rodney-street and Abercromby in point of mortality, while in the amount of court and cellar inhabitants it ranks next to Vauxhall. But St. Anne's and Lime-street present nearly the same ratio of mortality as of court and cellar population. Although fever is not of frequent occurrence in these wards, the general mortality is as high as we should expect to find it. But it is to be remembered that the proportion of court and cellar population is suggested as merely one element of mortality out of several which are exerting a constant influence; and where so many causes are at work, each pulling, as it were, a different way, and tending to derange the calculation, it is not to be expected that, when we attempt to show the influence of a single element, the result should be so uniform as we might expect to find it were that element the only one in action. People do not die merely because they inhabit places called courts or cellars, but because their dwellings are so constructed as to prevent proper ventilation, and because they are surrounded with filth, and because they are crowded together in such numbers as to poison the air which they breathe. Thus, although in Scotland Ward, where the ratio of fever and of mortality is comparatively low, a large proportion of the population inhabit courts or cellars, it may happen that those courts and cellars are of a superior construction, or that they are less filthy, or that their inhabitants are less densely crowded together; any one of which circumstances would account in some measure for the exception presented by the present table.

The next table shows the comparative character of the courts in the different districts of the town, with the relative prevalence

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of fever among the court population, and the relative mortality of each district. The last column gives the average number of inhabitants in each of the court houses.

TABLE 12.

Wards.	Fever Cases in Courts.	Per Centage of Courts		Total Deaths.	Inhabitants per House in Courts.
		Open.	Closed.		
	1 in			1 in	
Vauxhall	25·69	25·77	33·39	28·00	5·46
St. Paul's					
Exchange	21·42	2·15	63·66		5·68
Castle-street					
St. Peter's	28·08	17·29	28·94	31·36	5·51
Pitt-street					
Great George					
St. Anne's.	98·64	30·38	36·28	31·51	5·11
Lime Street					
Scotland	57·92	38·41	15·24	31·74	4·96
Rodney-street	108·64	23·88	3·88	41·62	4·31
Abercromby					
	37·01	24·11	31·73	*30·95	5·19

Here, again, it will be observed that the fever cases were the most numerous among the inhabitants of those courts which were the worst ventilated; 1 in 21½ of the population of the courts in Exchange district having been affected, while in Rodney-street district, where the courts are of the best construction, the inhabitants were affected in the smallest ratio, only 1 in 108½ having been attended with fever. With the exception, again, of St. Anne's and Lime-street, the same relation will be observed between the character of the courts and the prevalence of fever among their inhabitants in the intermediate districts. And here we find one circumstance which will help to explain the comparative exemption from fever and low mortality of Scotland Ward; for although so many of the inhabitants reside in courts, it appears that a larger proportion of those courts have a free ventilation, being open at both ends, than in any other district; and, with the exception of Rodney-street and Abercromby Wards, a smaller proportion are closed. In this ward, where 1 in 58 only of the residents in courts are annually attacked with fever, 38 per cent. of the courts are entirely open, and not more than 15 per cent. entirely closed; while, in Exchange and Castle-street Wards, the annual ratio of fever being 1 in 21½, the open courts form only 2⅙ per cent., and the closed 63⅔ per cent. of the whole number. The general mortality of the districts corresponds with the character of the courts in each, for although St. Anne's and Lime-street

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* The years 1838 and 1842 were the two years of lowest mortality, since the Registration Act came into force, the average mortality of Liverpool for the last five years being, as already stated, 1 in 28·75. So that the average absolute mortality of the different districts is somewhat higher than it appears in the above table, which gives, however, a pretty correct idea of their relative mortality.

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Wards have a larger proportion of closed courts than the Pitt-street district, whose mortality is a shade higher, they have also a considerably larger proportion of open courts, so that in this respect the two districts may be considered to be on an equality.

A similar connexion is observable between the density of the population of the courts (in so far as the average number of inhabitants per house is a test of that), and the fever and mortality in the various wards. This column exhibits another fact, explanatory of the apparent anomaly with reference to Scotland Ward in Table 11, viz., that with regard to density of population in its courts, it is more favourably situated than any of the other districts, excepting Rodney-street and Abercromby. St. Anne's and Lime-street rank next to it, and this may help to counteract the unfavourable influence which the number and character of their courts would otherwise exert; for although the difference may appear small when the average merely is stated, it is to be remembered that where the aggregate of houses in a district is of large amount, it requires a considerable number of densely-peopled courts to raise the average of each house in a perceptible degree; and, on the other hand, that a low comparative average, though it may not strike the eye, is a pretty sure proof that there are not a great many crowded houses in the district.

The records of the dispensary do not enable me to furnish the same precise information with regard to the comparative frequency of fever among the cellar population of the different wards, nor indeed am I enabled to state with any accuracy the proportion of fever treated in cellars throughout the parish generally. But from an average of several hundred cases of this disease attended by myself, chiefly at the north end of the town, and by Mr. Higginson, who has kindly favoured me with the particulars, at the south, I have calculated, as stated in my report to the Poor Law Commissioners, that the cellar population yields 35 per cent. more of fever than it ought to yield, as compared with the total working population. That is to say, if the whole of the working population of Liverpool lived in cellars, 135 cases of fever would appear among them for every 100 which now occur.

The following table shows that the proportion of damp and wet cellars is greatest, and least, in the same districts, respectively, where fever reaches its maximum and minimum; and that the three most unhealthy districts generally are the most unfavourably, while the three comparatively healthy districts are the most favourably situated in this respect; the proportion of damp and wet cellars in the former being 44½ per cent., and in the latter 28 per cent. of the whole. Other diseases are probably also more prevalent in cellars, for the total number of dispensary patients residing under ground is certainly much larger than the cellar proportion of the working classes should give; but that fever especially infests these abodes is shown by the fact (so far as a few hundred cases can be

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trusted to for the purpose) that while of every 100 dispensary patients of all descriptions attended by Mr. Higginson and by myself, 31·22 resided in cellars, there were 36·22 in cellars out of every 100 cases of fever.

TABLE 13.

Wards.	Per Centage of Damp Cellars.	Inhabitants per Cellar.	Total Fever.	Total Deaths.
			1 in	1 in
Vauxhall St. Paul's	43·83	3·03	34·06	27·02
Exchange Castle-street	59·34	3·18	32·81	29·60
St. Peter's Pitt-street Great George	53·37	3 87	56·51	31·36
St. Anne's Lime-street	34·47	2·99	109·30	31·51
Scotland	35·44	3·25	77·02	31·74
Rodney-street Abercromby	19·16	3·36	237·18	41·62

The small ratio of inhabitants per cellar in St. Anne's and Lime-street Wards will be noticed as another power to counteraction to the influence of their comparatively numerous court population.

In the next table is given the proportion of sewered streets among those inhabited chiefly by the working classes, with the proportion inhabited by other classes, and the total proportion of sewered streets in the various districts:—

TABLE 14.

Wards.	Per Centage length of Sewered Streets.			Total Fever.	Total Deaths.
	Working Classes.	Other Classes.	Total.		
				1 in	1 in
Vaxhall	15	58	30	27·44	23·50
St. Paul's Exchange Castle-street	20	59	41	37·66	30·67
St. Peter's Pitt-street Great George	24	65	48	56·51	31·36
St. Anne's Lime-street	6	50	43	109·30	31·51
Scotland	23	48	35	77·02	31·74
Rodney-street Abercromby	25	59	53	237·18	41·62
	20	57	44	55·80	30·95

The prevalence of fever and the rate of mortality proceed inversely the efficiency of sewerage, excepting in Scotland and St. Anne's districts, where the operation of this element is masked by the interference of alleviating causes. It should be noticed, also, that in St. Anne's and Lime-street Wards there are many streets occupied chiefly by "other classes," but where there are courts and cellars, in which the "working classes" of course reside. I am inclined to look upon the absence of sewerage—although certainly one element of mortality—as less influential in its action than some of the others which have been noticed. At the same time, there can be no question as to the importance of an effective system of sewerage carried into the heart of the densely-peopled localities inhabited by the working population.

Table 15 exhibits the influence of perhaps the most important element of all,—density of population. It has been already shown that Liverpool, in the aggregate, is the most densely-peopled town in England; we have now to see in what particular localities it is that the people are gathered together in such numbers as to give rise to this peculiarity.

TABLE 15.

Wards.	Square Yards to One Inhabitant.	Fever Cases to Population.	Total Deaths.	Average Inhabitants per House.
		1 in	1 in	
Vauxhall . . . . . . St. Paul's	19·50	34·06	27·02	7·42
Exchange . . . . Castle-street	17·26	32·81	29·60	7·82
St. Peter's . . . . . . Pitt-street . . . . Great George	25·49	56·51	31·36	7·67
St. Anne's . . . . . . Lime-street	24·86	109·30	31·51	6·00
Scotland	46·03	77·02	31·74	6·39
Rodney-street . . . . Abercromby	57·78	237·18	41·62	6·03
	30·70	55·80	30·95	6·83

On examining this table, we observe that, with the usual exception of St. Anne's district, fever and density of population advance, step by step, from Rodney-street and Abercromby, where they are both at their minimum, to Exchange Ward, where they reach their culminating point (13·45 square yards). The general mortality follows the same course, excepting in Vauxhall district, where it is higher than in Exchange and Castle-street Wards, although the ratio of condensation is somewhat less. The disturbing elements in this case are probably the very large proportion of court and cellar population in Vauxhall Ward (58·20 per cent. of the inhabitants), and the deficient sewerage;—in both these respects, as well as in point of mortality, the Vauxhall district being the worst of the six. But although its mortality appears higher, the proportion of fever is a shade lower, on the average of the five years, than in Exchange Ward; the numbers being 1 in 27·44 of the inhabitants annually in Vauxhall, and 1 in 26·21 in Exchange. This is a curious fact, and one worth inquiring into. It would be interesting to ascertain what are the causes of the very high rate of mortality in Vauxhall Ward,—the causes, I mean, medically speaking,—*i. e.*, the diseases which carry off so many of the inhabitants. This could only be done by an examination of the registers, to the accomplishment of which, I believe, obstacles exist. It is not unlikely that much of the excess of mortality would be found owing to the two other scourges of Liverpool, *i. e.*, convulsions among children, and consumption among adults; and that the higher ratio of fever in Exchange Ward may be explained by two other circumstances, viz., the inferior character of its courts, which are the worst in the town, not less than 69 per cent. being closed at both ends, while only 2½ per cent. are open,—and the very large proportion of Irish among its population, amounting as it does probably to three-fourths of the whole. On this subject I shall say more immediately. To understand the apparent discordance of the two facts that fever is more prevalent in one district, and the mortality higher in the other, it must be borne in mind that all diseases are not equally fatal. Only one individual, for instance, dies of fever out of every 10 or 15 attacked, while many more will die out of the same number attacked with convulsions or consumption; and the circumstances which predispose to fever may not be identical with those, which bring on convulsions or consumption. Overcrowding, combined with defective ventilation, is known to be especially favourable to the existence of the former disease, and we have seen that in Exchange Ward both these causes act with the greatest intensity. In Exchange Ward there are only 13·45 square yards to each inhabitant; in Vauxhall there are 22·35; in the former more than two-thirds of the courts are closed at both ends; in the latter less than one-fourth are of this construction. We have seen also that it is in these overcrowded and ill-ventilated courts of Exchange Ward that fever is principally found; for while the difference in the ratio of the general population of the two wards annually attacked with fever was only as 1 in 26·21 to 1 in 27·44, the difference in the ratio of the court population so attacked was as 1 in 18·96 to 1 in 25·21.

The average number of inhabitants per house appears, by the table, to be higher in Pitt-street district than in Vauxhall; but this may be partly explained by the fact that many of the front houses inhabited by the working classes in the former district are of a larger size than those in the other districts, and of course accommodate a greater number of families or of lodgers. In many instances these houses were formerly occupied by persons engaged in business, who gradually deserted them as the town moved eastward. The high average in this district, however,

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must be partly owing to the crowded state of some of the small court-houses, particularly in Great George Ward.

This table again shows influences at work to counteract the effect of the large amount of court and cellar population in St. Anne's and Scotland districts, the former presenting a lower average of inhabitants per house than any other district; while, in point both of general density of population, and of average per house, Scotland Ward stands next to Rodney and Abercromby, which are the most favourably situated as regards the first, and are nearly on a par with St. Anne's and Lime-street with reference to the second.

Let us now return for a moment to Exchange Ward, and the prevalence of fever there. I formerly mentioned that, in a particular locality of the town, the inhabitants are congregated together in the ratio of 657,963 to the geographical square mile; that district is situated in Exchange Ward, and it is to it that I wish to call your attention. It is bounded by Addison-street, Marybone, Johnson-street, Dale-street, and Byrom-street, with Great Crosshall-street, running through its centre, and has a superficies of about 105,000 square yards. In this small district are presented nearly all the evils on which I have dwelt, in an aggravated form. It has the largest amount of cellar population, the greatest number of damp cellars, the courts are of the worst construction, the sewerage is more defective than in any part of the town, with the exception of some portions of Vauxhall Ward, few of the front houses have privies or ash-pits, most of the streets and courts are the filthiest in the town, and density of population here reaches its highest point. The district contained, in 1841, 1531 houses, and 11,860 inhabitants; giving a ratio of 8·91 square yards to each inhabitant, and 7·74 inhabitants per house. As might be expected, it is here that fever has its favourite abode; 503 cases, out of a population of 10,853, having been attended annually by the dispensaries, on an average of five years; *i. e.*, 1 in 21·57 of the entire population was attacked yearly. That portion of the district bounded by Addison-street and Great Crosshall-street contained, in 1841, 811 houses and 7938 inhabitants, on about 49,000 square yards, giving the ratio which I mentioned, of 657,963 to the geographical square mile.* Excluding Byrom-street, the number of square yards to each inhabitant was 6·23, and of inhabitants per house, 8·33. But if we take a single street of this portion of the district, Lace-street—which, when I was in the habit of visiting it four or five years ago, was unquestionably the worst street in Liverpool—the result will be still more striking. The street has 1434 inhabitants in 109 houses, 51 of which are situated in courts (13·15 per house), and has, including the houses, an area which gives only about four square yards to each inhabitant. In this street, 1 in 9·87 of the inhabitants was yearly attacked with fever—on the average of five years![*] Of 58 front houses, 51 are without either privy or ash-pit. The effect of this absence of necessary conveniences is seen in the state of the courts, and of the entries and back passages connected with them, which may be more easily imagined than described. Next to Lace-street, in all that is abominable, ranks North-street (in the Dale-street division of the district), which has seven square yards to each inhabitant, 10 inhabitants per house, and more than three-fourths of its front houses unprovided with out-offices. Nothing can exceed the filth of some of its courts. Here about one in seven of the inhabitants were fever patients yearly. The only streets in Vauxhall Ward which at all approach to Lace-street and North-street in filthiness, and in the other particulars I have mentioned, are Oriel-street, off Vauxhall Road, and Stockdale-street, off Marybone. Oriel-street had, about five years ago, 1585 inhabitants on an area giving six square yards to each; 41 out of 50 front houses had no place of deposit for refuse, while the cellars under many of the inhabited houses in courts were used as receptacles for manure and various kinds of filth. The annual ratio of fever was about 1 in 11 of the inhabitants.

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* In Exchange, Vauxhall, and St. Paul's Wards, there is a population of 62,003, condensed into the ratio of 260,438 per geographical square mile. The maximum density of London, according to Mr. Farr, is "nearly 243,000 to a geographical square mile."

Before ascertaining the relative mortality of the different wards, I felt little doubt that Exchange Ward would show the highest rate of mortality, from my knowledge of the peculiar condition of the district which I have described. One or two circumstances have been mentioned, which probably contribute to the higher rate of mortality in Vauxhall Ward; but I still think it likely that if the deaths in the Lace-street district could be separated from those in the rest of Exchange Ward and in St. Paul's Ward, with which they are associated in the Returns, the mortality in that district would be found to be at least as high as it is in Vauxhall Ward.

In the south division of the town there is an analogous district, not nearly so bad as the Lace-street district, but bearing the same relation to the remainder of the southern division as the Lace-street district does to the northern end of the town. It is situated in Great George Ward, and includes the streets between St. James'-street and the Docks, extending from Crosbie-street on one side to New Bird-street on the other. In these streets there are 11,915 people, with 10·35 square yards to each, and 7·88 inhabitants per house. One in 30·67 of the inhabitants was attended annually with fever. The three worst streets of the district are Crosbie-street, Brick-street, and New Bird-street, which contain in

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[*] Attended at their own houses by the dispensary officers alone; *i. e.* exclusive of children brought to the dispensaries, as well as of club patients, and those attended by private practitioners.

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the aggregate about 4600 inhabitants, a large proportion of whom are Irish. Crosbie-street affords only seven square yards to each of its 1544 inhabitants, and New Bird-street only about six to each of 1835 inhabitants. Of the 339 houses in these two streets, 209 are situated in courts, and only 130 to the front of the street. The average number of inhabitants per house is 9·08 in New Bird-street, and 11·27 in Crosbie-street. It was in this street that the court was situated which was mentioned before, as having had nearly one-half its inhabitants treated for fever, by the Dispensary, in a single year. The ratio of fever for the street generally was 1 in 16·79.

The Irish poor are especially exposed to the operation of the "physical causes" of fever. "It is they who inhabit the filthiest and worst-ventilated courts and cellars, who congregate the most numerously in dirty lodging-houses, who are the least cleanly in their habits, and the most apathetic about everything that befalls them." Accordingly, it is a well ascertained fact that, wherever they are found, they are attacked with fever in a larger proportion than the native inhabitants of Great Britain. It may be said that this is merely the result of their greater poverty, which deprives them of a proper supply of the necessaries of life, and compels them to select the most unhealthy (because the cheapest) localities as their places of residence. To a great extent this is true; but at the same time there appears to be among the lowest classes of Irish such an innate indifference to filth, such a low standard of comfort, and such a gregariousness as leads them, even when not driven by necessity, into the unhealthy localities where they are found to congregate; and which they render still more unhealthy by their recklessness and their peculiar habits.[*] This idea is confirmed by Mr. Baker, Surgeon and Inspector of Factories at Leeds, from whose report on the sanatory condition of that town I quote the following remarks[†]:—"Whether it is the improvidence of the Irish character, or their natural habits are filthy, or both, or whether there exists the real destitution which is apparent in their dwellings, I know not; but in them is more of penury, and starvation, and dirt, than in any other class of people which I have ever seen. The proverbial misery of the poorer Irish people is not overlooked, nor indeed is it apparently without reason; but whether that misery is the result of improvidence or

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[*] "Nor," as I have elsewhere observed, "does the evil stop with themselves. By their example and intercourse with others they are rapidly lowering the standard of comfort among their English neighbours, communicating their own vicious and apathetic habits, and fast extinguishing all sense of moral dignity, independence, and self-respect. * * I am persuaded that so long as the native inhabitants are exposed to the inroads of numerous hordes of uneducated Irish, spreading physical and moral contamination around them, it will be in vain to expect that any sanatory code can cause fever to disappear from Liverpool."—*Local Reports on the Sanatory Condition of the Labouring Population of England.* 'Liverpool;' pp. 293, 294.

[†] Local Reports on the Sanitary Condition of the Labouring Population of England. 'Leeds;' p. 392.

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not, is another question altogether; for the average amount of labour which they obtain in Leeds is evidently quite equal to that of the English labourers." He then gives a table of the wages of a large number of Irish weavers and their families, in the months of November of ten successive years (1831-40), and October, 1841; and goes on to say, "The average rate of wages of the labouring classes of England scarcely exceeds this; and it is presumed, therefore, that the statement is borne out, that were the habits of the Irish settler made more provident by sanatory regulations—regulations affecting his dwelling, his means of livelihood, and his indifference to personal and local cleanliness, and by the example of his English neighbours—that his character would cease to be what it has long been, viz., an expression of desolation and misery; that he would not be so often found the recipient of parochial and general charity, but might possess the same independence which his English neighbours possess, and that the destitution and mortality of towns might be materially reduced."

In conformity with what has been said, the districts of Liverpool, where we have seen fever to be most prevalent, are exactly those where the Irish are congregated in the greatest numbers, viz., the Lace-street district in Exchange Ward, and the Crosbie-street district in Great George Ward. In Lace-street, about four years ago, where 1 in 9·87 of the inhabitants was yearly attacked with fever, 87·22 per cent., or seven-eighths of the entire population, were Irish; in North-street, 1 in 7 of the inhabitants being fever patients, yearly, the proportion of Irish among its population was 85·11 per cent., or six-sevenths of the whole. In Crosbie-street, it was stated not long ago by the Rev. Mr. Parker, of St. Patrick's chapel, that 1196 of the inhabitants (about 80 per cent.) were Roman Catholics, which will give a tolerably correct approximation to the number of Irish resident in the street. The greater liability of the Irish to attacks of fever is more directly proved by the following facts, thrown into a tabular form, showing the ratio which the proportion of Irish fever patients, out of the total number of Irish patients attended by the dispensaries, bears to the proportion of English fever patients out of the total number of English patients. The numbers comprise only the medical cases attended by the officers of the North Dispensary, during nine months of the year 1838:—

	Total Medical Cases.	Fever Cases.	Per Centage of Fever Cases.
English	2,428	637	26·07
Irish	1,836	601	32·73

The Irish fever patients formed 43¼ per cent. of the whole fever cases attended; but in a district comprising Exchange and Castle-street Wards, and a few adjoining streets of St. Paul's and Vauxhall Wards, they amounted to not less than 54½ per cent.

If the facts which we have now brought forward are really what they profess to be, they are surely calculated to arrest the attention of all who are interested in the welfare of the community. Not the least striking result of the investigation is the very different rate of mortality which we have found going on in the various districts of the town; for while in Rodney-street and Abercromby Wards, with upwards of 30,000 inhabitants, the mortality is below that of Birmingham—the most favoured in this respect of the large towns in England—in Vauxhall Ward, with a nearly equal amount of population, the mortality exceeds that which prevails in tropical regions. In Rodney-street and Abercromby Wards, 100 persons die annually out of 4162; in Vauxhall Ward, 2350 persons are sufficient to furnish the same number of deaths, leaving an excess of 1812 persons engaged in furnishing additional deaths at this high rate of mortality. In other words, 177 persons die annually in Vauxhall Ward for every 100 dying out of an equal amount of population in Rodney-street and Abercromby Wards. Should not this simple fact be sufficient to arouse the attention and stimulate the exertions of the most indifferent? It is calculated that about 1500 lives are annually lost by shipwreck on the British coast, and not a single wreck occurs without exciting a large amount of public sympathy. These lives are lost by the decrees of Providence, by causes which perhaps no human foresight could avert; and yet we look idly on, while on a small spot of that coast, less than two square miles in extent, hundreds of our fellow-townsmen perish yearly, by causes which in a great measure it is within our power to remedy or remove. And here I must again beg to guard myself from the chance of its being supposed that I hold the defects which have been noticed as chargeable with the whole of the excess of mortality in Liverpool, or of the excess of mortality in one district of Liverpool over another. Part of the excessive mortality of Vauxhall Ward over Rodney-street and Abercromby Wards, must be ascribed to the different character of the population of the two districts (although in this last nearly one-fourth of the inhabitants reside in courts or cellars of a superior construction); and if it can be established that in other towns, where the mortality is lower, the lower classes have a greater command of the necessaries of life, then there can be no question but that this must be held sufficient to explain part of the extraordinary mortality of Liverpool. Of course no one but a Utopian dreamer can expect that—where there is such a wide difference in the command of the necessaries of life as must always exist between one section of the community and another—any sanatory regulations will succeed in reducing the mortality of the poor to the same level with that of the wealthier classes; but after making every allowance of this kind, will any candid mind refuse to admit that, in the case of Liverpool, a large balance must still remain to be charged to the account of the physical causes which have been pointed out? Does any one suppose that if the inhabitants o

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Rodney-street and Abercromby-square were to exchange places with those of Vauxhall or Exchange Wards, leaving their spacious mansions to be occupied by the inhabitants of the latter districts, while they took up their residence in the filthy and miserable courts and cellars of Vauxhall or Exchange—their relative command of the necessaries of life remaining undisturbed—does any one suppose that the relative mortality of the two classes would likewise remain unaltered? that 1 in 23 would still die in Rodney-street, and not more than 1 in 41 in Vauxhall? or that the average duration of life would not be prolonged beyond 15 years among the former inhabitants of Vauxhall, and fall far below 35 years among the present occupants of Rodney-street?

That the influence of these seats of pestilence is not confined to those who reside within their immediate limits, but extends itself to the whole town, poisoning the atmosphere which all classes are compelled to breathe, is shown by the fact that the excess of mortality, as compared with other towns, is found to affect the highest as well as the lowest classes of the community. This appears from the following table, compiled from Mr. Chadwick's Sanatory Report on England, (pp. 158-161):—

Table 16.

Towns.	Average Age at Death.			General Average.
	Gentry and Professional Persons.	Tradesmen.	Labourers, &c.	
Kendal	45 years	39 years	34 years	36 years
Bath	55 ,,	37 ,,	25 ,,	31 ,,
Four Metropolitan Unions	44 ,,	28 ,,	22 ,,	25 ,,
Leeds	44 ,,	27 ,,	19 ,,	21 ,,
Bolton	34 ,,	23 ,,	18 ,,	19 ,,
Manchester	38 ,,	20 ,,	17 ,,	18 ,,
Liverpool	35 ,,	22 ,,	15 ,,	17 ,,

So that all classes of the inhabitants are interested in effecting an abatement of the evils with which Liverpool is afflicted.

An Act "for the promotion of the Health of the Inhabitants of Liverpool," which obtained the Royal Assent on the 18th of June, came into operation on the 1st November last year; and notwithstanding its defects and omissions, there is no doubt that, if strictly enforced, it will effect a very great improvement in the character of the dwellings in future to be erected for the use of the working population.

This Act fixes the minimum width of streets and courts in future to be built, as well as the mininum size of rooms and windows; it prohibits the occupation of cellars in courts as dwellings, and enacts that, after 1st July, 1844, no cellar is to be occupied as a dwelling-place unless it be at least seven feet in height, and have two feet of its height above the level of the street. It provides for the

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draining of houses situated in courts; and there are clauses which will probably be found to be ineffectual, which relate to the cleansing of privies and cesspools, &c., and to the cleansing of houses, which are certified to be in a filthy and unwholesome condition.

The Act, imperfect as it is, is almost entirely prospective, no remedy being attempted (except in the case of the cellars) for the evils previously existing. But something surely might be done, and ought to be done, to improve the condition of the large body of the working-classes, already suffering from these injurious agencies; for it is to be remembered that if nothing be attempted, the destructive influence of these agencies will not be confined to the present generation, but will be exerted throughout all future time, at least so long as the present residences of the labouring population continue in a habitable state. While these residences remain in their present condition, Liverpool can never be a healthy town.

Of the 1982 courts within the parish, 629 are closed at both ends; and with these the Act does not attempt to interfere. But these courts, in their present state, are quite unfit for the habitation of human beings; and why should not power be obtained to purchase and pull down the house, wall, or building—whatever it may be—which obstructs one end of the court, and thus open a communication with the external atmosphere. After all, the court would be imperfectly ventilated. A great improvement would be effected also in the health of some of the densely-peopled parts of the town, by opening them up and intersecting them with wide and airy streets, so as to form a substitute for those parks and squares which it seems impracticable to introduce into the heart of a fully-peopled town. An instance has been already mentioned where a measure of this kind was attended with a favourable effect in Liverpool, and in other places it has been found equally beneficial. From a paper published in the Philosophical Transactions for 1782, it appears that the rate of mortality in York had diminished from 1 in 21¾ in 1735, to 1 in 28¼ in 1781; and this great improvement was ascribed chiefly to the fact that many of the streets had been widened by pulling down old houses which almost met in the upper stories so as nearly to exclude the sun and air from the streets and lower apartments, and to additional drains having been made, and other measures taken to promote the cleanliness of the city.

The common lodging-houses—those fruitful sources of mischief—ought to be subject to regulation and inspection by the public authorities. No one should be permitted to keep a house of this kind unless he have previously received a license from the magistrates, who should fix the maximum number of lodgers allowed to sleep in each house, and in each room of the house; the number being of course proportioned to the cubic contents of the space they are to occupy. No house should be licensed whose construc-

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The dame-schools and common day-schools, which are productive of the same physical evils in a less aggravated degree, should also be subject to license and inspection. Nor, even should this measure have the effect of diminishing the number of scholars, need any fear be entertained that the cause of education would suffer from the circumstance; for in nine cases out of ten the children are sent to the dame-school merely in order to be out of the way of mischief, and not with the hope or expectation that they will learn anything useful; and were it otherwise, "the generality of the teachers, both of the dame and day-schools, are wholly incompetent to the task of instruction; and their ignorance, on the most common topics, is lamentable;"* although the masters themselves, according to the Committee of the Manchester Statistical Society, "have generally a better opinion of their own qualifications for their office. One of them observed, during a visit paid to his school, that there were too many schools to do any good; adding, 'I wish Government would pass a law that nobody but *them as is high larnt* should keep school, and then *we* might stand a chance to do some good.'" (Report on Manchester, 2nd edit. p. 7.)

As there is a separate Sewerage Act for Liverpool, the "Improvement Act" says nothing on the subject of sewers. But an attempt should be made to direct a portion of the funds annually levied from the inhabitants, to the sewerage of the poorer streets, where it is so loudly called for, but which have hitherto been so much neglected. I am glad, however, to learn, that the Commissioners have determined to devote, immediately, some part of their attention to the class of streets in question.

A change in the construction of the sewers would make them much more extensively useful than in the mere removal of the surface-water, to which they are at present almost confined. Were they properly trapped, and fitted up with cast-iron flushing gates, the experience of the Holborn and Finsbury district has shown that the sweepings of the streets and other refuse matter might be carried off without any inconvenience to the inhabitants, and with an ultimate saving of expense. It has been found that the ordinary flow of water in the sewers, accumulating behind the flushing-gates, is sufficient, when the gates are opened, to sweep off the deposit which otherwise might take place. No town can be better situated than Liverpool for this purpose, seated as it is on undulating ground, and washed by a broad river with daily tides, which would immediately carry off into the ocean the refuse matter discharged from the sewers.

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* Report of Manchester Statistical Society, on the State of Education in the Borough of Salford.

Every ash-pit should be made to communicate with the sewer by a guarded drain, so as to carry off at once the fluid portion of its noxious contents: the poisonous effluvia from the remainder would then act with diminished power. Additional advantage would be gained by causing every ash-pit to be effectually covered over.

In connection with sewerage, I would suggest, in addition, that no cellar should be allowed to be inhabited unless situated in a street that is sewered, and where the sewer is below the level of the cellar floor; and every such cellar should have a properly constructed drain, communicating with the sewer.

Lastly, I would suggest that the very inadequate supply of privies should be remedied by the establishment of public buildings, distributed over the town in numbers and situations regulated by the wants of each locality, *i. e.*, by the number of houses in each district, found to be destitute of these necessary conveniences.

I cannot conclude without expressing my regret that, in this country, the public health should occupy such a very subordinate place in the estimation of the public authorities. In this respect we are far behind our continental neighbours. In France and other countries on the continent, the promotion of the public health is a constant object of solicitude, both with the government and the municipal councils. Nor is any important matter bearing upon this point decided on without the sanction and concurrence of the best professional and scientific opinions, which are previously sought for by the Minister of Public Works. In Paris there is a Council of Health, appointed by the Prefect of Police; and to this body, as well as to the Academy of Medicine, questions of medical police are constantly referred by the Central Government. There can be no doubt that if the Town Council of Liverpool had consulted any medical practitioner acquainted with the poorer districts of the town, previously to applying to Parliament for the "Improvement Act," that Act would itself have been greatly improved. The present council has degenerated, in this respect, from the practice of their predecessors 40 years ago, for "in the beginning of the year 1802, the corporation of Liverpool, being about to apply to Parliament for powers to improve the streets and the police of the town, requested the physicians of the infirmary and dispensary to suggest to them 'such alterations as might contribute to the health and comfort of the inhabitants,' in order that, where necessary, they might include in the Bill about to be brought into Parliament, the powers requisite to carry such alterations into effect. The physicians took this request into serious consideration, and presented a report of considerable extent, including a view of the causes of the uncommon sickliness of the two preceding years, and of the measures requisite to prevent its recurrence, and to remove the frequency of contagion

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in the habitations of the poor."* With this view they recommended the removal of slaughter-houses, and all other offensive trades or manufactories, the consumption of smoke, the enforcing of cleanliness in the streets, a general review of the common sewers, and other measures of a like nature. But in a more especial manner, they directed the attention of the Town Council to the habitations of the poor, noticing particularly the evils connected with the inhabited cellars and courts. With regard to the former, they say, "The vast number of persons that occupy such dwellings, and the impossibility of finding other habitations, forbid us to hope that any recommendation for preventing them from being generally inhabited could be attended with immediate effect. But a general survey should be made of these subterraneous dwellings, and such means adopted for promoting their salubrity as circumstances require and admit." They then specify the alterations which they deem necessary, and recommend that "in regard to all houses to be built in future, powers should be obtained to prevent the cellars from being inhabited at all, except they be constructed according to the plan just pointed out." The Report here mentions a few places in which, from local circumstances, the cellars are particularly obnoxious, and advises that, as soon as possible, they should be emptied of their inhabitants, and filled up. It proceeds as follows:—"The habitations of the poor in the greater part of the small and narrow courts, back from the streets, are equally objectionable in point of health as in the cellars. It is much to be lamented that such a form of building should have grown into general practice. * * Powers should be obtained for preventing ground from being occupied with buildings of this description in future; and the proprietors of courts already built might be compelled to give them the ventilation of a thorough draught of air, which would, in general, be obtained with little difficulty. If any courts are permitted to be built in future, it should be on condition that they may be made of a certain width; that the entrance should not be through an arch-way; that the houses should not be above two stories high; and that the upper end of the court should be kept open. Every court should have two or more necessaries, according to its size, and a plentiful supply of water."

Dr. Currie adds, that "every attention was paid to this memorial by the gentlemen of the common council of the corporation; and in the draught of the Bill proposed to be brought into Parliament, such clauses were introduced as were necessary to enable them to carry into effect the various regulations recommended to their notice. But the interests of different individuals being affected, difficulties have arisen in procuring that general assent so desirable in all such applications to the Legislature. The measure is, however, in progress, and it is not to be doubted that, by the exercise of candour and patience, every obstacle will be removed, and that the public good will triumph over all inferior considerations."

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* Currie's Medical Reports, 4th edit., vol. i., pp. 371, 372.

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Dr. Currie's expectations were not realized. Inferior considerations triumphed over the public good. Had it been otherwise, and had the rate of mortality in Liverpool been thus reduced to that in Birmingham, nearly 40,000 lives would have been saved in the parish of Liverpool, during the interval which has elapsed since these recommendations were offered to the notice of the common council. Could the rate of mortality now be reduced to that of Birmingham, 1250 lives would be annually saved.

Borough of Preston; Report on its Sanatory condition.
By the REV. J. CLAY.[*]

Preston.

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THE state of the town, with regard to health and mortality, varies with the social rank and with the employment of the inhabitants; with the cleansing, draining, and ventilation of their dwellings, and of the streets, courts, &c., in which those dwellings are situated. It would have been desirable to obtain the population of all the streets, in order to show this variation more at length; time, however, has not permitted this to be done, and we must content ourselves with a comparison upon a more limited scale, which will nevertheless illustrate the effects on the one hand, of good air, cleansing, &c., and the total want of those advantages on the other. Before going into such particulars it will be well to advert to certain general facts which have been arrived at through the laborious and accurate investigation of Mr. S. Cartwright.

TABLE 1.

AVERAGE AGE of DEATH in PRESTON, from the 1st July, 1837, to the 30th June, 1843. (Calculated from the Superintendent Registrar's Books.)

Classes.	Average Age of		Per Centage of each Class dying			Total Number of Deaths, (upon which the Calculations are made).
	Total Deaths.	Deaths after 21 Years of Age.	Above 21 Years old.	Above 5 Years old.	Under 5 Years old.	
1. Gentry and professional men, and their families .	47·39	61·165	76·31	82·43	17·57	148
2. Tradesmen and their families .	31·63	54·73	51·83	61·78	38·22	764
3. Operatives and their families .	18·28	50·305	31·64	44·58	55·42	8017
Average of the whole	19·6	51·25	34·11	46·68	53·32	6)8920
						1488

This table gives the average of deaths in Preston for the six years ending 30th June, 1843; and respects, 1. The Gentry;

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[*] Extracted from the Report on the state of large towns in Lancashire, by Dr. Lyon Playfair.

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2. The Tradesmen; and 3. The Operatives and their respective families. Taking the average population during that period at 50,000, which is most probably higher than the truth, we have the deaths yearly amounting to 1 in 33·6 of the inhabitants. From the Mortuary Registers of 1841, it appeared that in the Preston *Union* the rate of mortality in that year was 2·9 per cent.; in the *Borough* the rate of mortality was still higher. The population being 50,131, and the average deaths for 1839, 1840, and 1841 being 1734, the mortality was upwards of 3·4 per cent.; a rate exceeding that of Manchester (3·2 per cent.), and nearly approaching that of Liverpool (3·5 per cent.). But it appears that the years 1840-41 were accompanied in Preston by a very unusual number of deaths; for the deaths in 1838-9 averaged only 1273, and those for 1842-43 only 1461. It will be right, then, to take the mean of the six years, as shown by the table above, viz., 1488; and still a rate of mortality is evinced very nearly approaching to 3 per cent., viz. 2·976, and that upon a population somewhat over estimated. Now, recollecting that many districts in England and Wales exhibit a rate of mortality below 2 per cent. per annum, and assuming, as it will be seen from facts hereafter to be presented, we have a right to assume, that Preston is naturally healthy, and that the mortality should not much exceed 2 per cent., it results that during the six years under consideration there have been upwards of 2800 deaths more than there would have been but for the injurious operation of causes, which, to say the least, are susceptible of great control.

While the ratio of deaths to population is so great, it will be also seen from the table that the chances of life at infancy, including all classes in the calculation, are very low. These chances, as estimated by the lowest of the insurance tables (Northampton), are given at 25·18 years; but, as shown by the actual experience of Preston (gathered from the average age at which the inhabitants die), they are only 19·6 years. The average age of the living, as calculated from the Census of 1841, is 24·435. It should be observed that this low average age at death is effected by the great preponderance of the third-class "operatives and their families," who, owing to their large proportionate numbers, bring down the general average to a near approximation to their own, which is 18·28 years. The chances of life among the "professional men and their families" are high—47·39 years; among the "tradesmen" they are scarcely as favourable as they are elsewhere—31·63 years. If the duration of life in Preston be calculated from an equal number of each class, we find that 32·43 years is its low term. When the age of 21 is passed, it appears that the chances of life come very near to the general rate. As compared to the mortality of the metropolis, the average age of gentlemen and tradesmen in Preston is favourable; but it is otherwise with the labourers, as shown by the following table—

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Classes.	Average Age at Death, including Children.	
	Metropolis.	Preston.
	Years.	Years.
Gentlemen . . .	44	47
Tradesmen . . .	25	32
Labourers . . .	22	18
	30⅓	32⅓

The large proportion of infant mortality among the working class is also evinced by the table. While the gentry lose only 17½ per cent. of infant life, the operatives lose 55½ per cent. For the whole of England and Wales, the per centage of deaths under five years of age is 39·1.

Mr. Cartwright has drawn up an interesting table No. 2, to show the connexion between the varying mortality and the varying seasons, by giving the centesimal proportion of deaths in each quarter of the year.

TABLE 2.

EFFECT of SEASONS upon HEALTH, as evinced by the Deaths for the Six Years ending June, 1843.

——	July, August, September.	October, November, December.	January, February, March.	April, May, June.	Whole Year.
Calculated on—					
Total number of deaths . . .	20·352	24·134	28·088	27·426	100
Under 5 years old	21·195	23·489	26·941	28·373	100
Above 5 ,, . .	19·363	24·868	29·415	26·352	100
Above 21 ,, . .	19·437	24·261	29·448	26·854	100
Average age of death during the six years	18·75 yrs.	20·24 yrs.	21·29 yrs.	19·53 yrs.	19·6 yrs.

Looking first at the general results of this table, we perceive that the per centage of mortality is least in the quarter embracing July, August, and September, and greatest in the quarter from January 1st to March 31st; while April, May, and June are more fatal than October, November, and December. Infantile mortality seems less influenced by season than that of older persons; varying at the utmost only about 7 per cent. The difference, both as regards those above 5 and those above 21, between the September quarter and the March quarter, is somewhat more than 10 per cent.

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TABLE 3.

AVERAGE AGE of DEATH of the above Classes, Nos. 1, 2, 3, for every Quarter and the whole of each Year, from 1st July, 1837, to 30th June, 1843.

	1st July to 1st October.				1st October to 10th January.				1st January to 1st April.				1st April to 1st July.				Whole Year.			
	1.	2.	3.	Total.	1.	2.	3.	Total.	1.	2.	3.	Total.	1.	2.	3.	Total.	1.	2.	3.	Total.
1837–8 . .	37·6	24·075	15·24	16·72	61·75	29·14	20·58	22·03	65·25	35·49	23·1	25·10	46·75	26·375	19·43	20·61	50·59	29·64	19·9	21·41
1838–9 . .	42·5	38·525	22·115	23·73	50·93	26·695	17·25	18·86	65·785	35·2	20·9	22·84	22·1	34·94	18·655	19·915	47·5	33·435	19·71	21·31
1839–40 .	38·	34·29	17·3	18·72	33·86	39·03	19·03	21·48	54·71	26·04	16·53	18·32	49·5	23·81	12·27	13·24	44·61	29·67	15·42	16·45
1840–1 . .	43·	18·57	15·23	15·7	31·61	28·32	14·11	15·98	38·5	19·4	16·16	16·8	49·	41·95	19·93	22·5	37·73	35·31	16·14	17·55
1841–2 . .	69·875	32·61	19·915	22·565	59·5	27·45	22·01	22·62	50·6	29·93	20·51	21·59	62·5	29·525	13·33	19·875	61·98	29·86	20·22	20·99
1842–3 . .	36·2	26·16	13·59	15·05	43·16	32·13	18·66	20·45	32·4	38·05	21·63	23·11	58·25	32·2	19·35	21·04	41·93	31·88	18·27	19·87
Average age of the six years.	44·53	29·04	17·22	18·75	46·8	30·46	18·61	20·24	51·21	30·68	19·805	21·29	48.02	31·04	18·	19·53	47·39	31·63	18·28	19·6

TABLE 4.

The NUMBER of DEATHS in the 6 years, from which the preceding Tables are calculated.

	1st July to 1st October.				1st October to 1st January.				1st January to 1st April.				1st April to 1st July.				Whole Year.			
	1.	2.	3.	Total.	1.	2.	3.	Total.	1.	2.	3.	Total.	1.	2.	3.	Total.	1.	2.	3.	Total.
1837–8 . .	5	20	238	263	4	18	266	288	4	43	283	330	10	40	331	381	23	121	1118	1262
1838–9 . .	5	20	238	263	7	28	277	312	7	29	342	378	5	24	295	324	24	101	1152	1277
1839–40 .	3	19	250	272	7	35	286	328	7	50	413	470	5	40	624	669	22	144	1573	1739
1840–1 . .	2	34	318	354	14	47	439	500	10	35	480	525	6	33	311	350	32	149	1548	1729
1841–2 . .	8	28	249	285	4	30	314	348	5	35	407	447	7	20	318	345	24	113	1288	1425
1842–3 . .	5	35	339	379	9	34	336	379	5	29	325	359	4	38	338	380	23	136	1338	1497
Total . .	28	156	1632	1816	45	192	1918	2155	38	221	2250	2509	37	195	2217	2449	148	764	8017	8929

6)8929

Mean for the 6 years . . . 1488

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TABLE 5.

AVERAGE AGE of DEATH of those who had attained the Age of 21 Years.

—	1st July to 1st October.				1st October to 1st January.				1st January to 1st April.				1st April to 1st July.				Whole Year.			
	1.	2.	3.	Total.	1.	2.	3.	Total.	1.	2.	3.	Total.	1.	2.	3.	Total.	1.	2.	3.	Total.
1837–8 .	62·5	57·	45·8	47·54	61·75	45·68	48·795	48·94	65·25	52·85	59·815	58·64	56·125	49·08	50·25	50·49	60·24	51·23	51·795	52·046
1838–9 .	63·17	61·58	49·41	51·	57·67	62·1	50·26	51·91	65·785	56·	54·76	55·29	52·5	50·875	48·47	48·775	61·17	56·39	50·98	51·95
1839–40 .	57·	51·92	50·9	51·17	47·1	57·02	51·36	52·33	63·83	57·83	47·54	49·62	47·5	54·44	51·78	51·65	53·89	55·97	50·27	51·205
1840–1 .	43·	45·58	47·87	47·49	59·21	54·76	47·87	49·66	54·5	54·17	51·81	51·83	55·5	52·54	49·6	50·35	55·21	51·61	49·23	50·04
1841–2 .	69·875	57·17	49·63	52·04	67·	53·785	53·78	54·18	63·25	55·67	50·3	51·18	62·5	52·2	45·905	47·3	65·98	54·99	49·98	51·
1842–3 .	56·17	59·03	47·97	49·91	62·33	61·38	50·08	52·11	81·	59·72	51·04	52·54	75·5	53·95	49·61	50·125	66·5	58·21	49·58	51·27
Average age of the six years.	58·62	55·38	48·6	49·86	59·18	55·79	50·36	51·52	65·6	56·04	52·54	53·18	58·27	52·18	49·27	49·78	61·165	54·73	50·305	51·25

TABLE 6.

The NUMBER of DEATHS after 21 Years old.

—	1st July to 1st October.				1st October to 1st January.				1st January to 1st April.				1st April to 1st July.				Whole Year.			
	1	2.	3.	Total.	1.	2.	3	Total.	1.	2.	3.	Total.	1.	2.	3.	Total.	1.	2.	3.	Total.
1837–8 .	3	8	70	81	4	11	105	120	4	28	114	146	8	19	116	143	19	66	405	490
1838–9 .	3	12	96	111	6	10	83	99	7	18	118	143	2	16	102	120	18	56	399	473
1839–40 .	2	12	77	91	5	23	95	123	6	21	124	151	5	16	123	144	18	72	419	509
1840–1 .	2	12	84	98	7	23	103	133	7	12	126	145	5	26	110	141	21	73	423	517
1841–2 .	8	15	91	114	4	14	115	133	4	18	146	168	7	10	111	128	23	57	463	543
1842–3 .	3	15	79	97	6	17	108	131	2	18	124	144	3	22	117	142	14	72	428	514
Total. .	21	74	497	592	32	98	609	739	30	115	752	897	30	109	679	818	113	396	2537	3046

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TABLE 7.

The NUMBER of DEATHS above and under 5 Years old.

The first line of figures opposite each year shows the number Dying above 5 Years, the second line shows those below 5 Years of Age.

—		1st July to 1st October.				1st October to 1st January.				1st January to 1st April.				1st April to 1st July.				Whole Year.			
		1.	2.	3.	Total.	1.	2.	3.	Total.	1.	2.	3.	Total.	1.	2.	3.	Total.	1.	2.	3.	Total.
1837–8	Above 5 . .	3	10	98	111	4	12	125	141	4	33	143	180	9	27	150	186	20	82	516	618
	Under 5 . .	2	10	140	152	0	6	141	147	0	10	140	150	1	13	181	195	3	39	602	644
1838–9	Above 5 . .	4	15	124	143	7	18	119	144	7	21	157	185	2	18	134	154	20	72	534	626
	Under 5 . .	1	5	114	120	0	10	158	168	0	8	185	193	3	6	161	170	4	29	618	651
1839–40	Above 5 . .	2	14	100	116	5	26	125	156	6	27	180	213	5	19	176	200	18	86	581	685
	Under 5 . .	1	5	150	156	2	9	161	172	1	23	233	257	0	21	448	469	4	58	992	1054
1840–1	Above 5 . .	2	18	127	147	8	28	191	227	7	18	197	222	6	27	154	187	23	91	669	783
	Under 5 . .	0	16	191	207	6	19	248	273	3	17	283	303	0	6	157	163	9	58	879	946
1841–2	Above 5 . .	8	19	116	143	4	18	163	185	5	20	215	240	7	14	179	180	24	71	653	748
	Under 5 . .	0	9	133	142	0	12	151	163	0	15	192	207	0	6	139	165	0	42	635	677
1842–3	Above 5 . .	4	16	129	149	7	21	158	186	2	19	168	189	4	24	166	194	17	80	621	718
	Under 5 . .	1	19	210	230	2	13	178	193	3	10	157	170	0	14	172	186	6	56	717	779
Above 5 years old.	Average of 6 years .	3·8	15·3	115·7	134·8	5·8	20·5	146·8	173	5·2	23	176·7	204·8	5·5	21·5	159·8	183·5	20·3	80·3	595·7	696·3
	Total Deaths	23	92	694	809	35	123	881	1039	31	138	1060	1229	33	129	959	1101	122	482	3574	4178
Under 5 years old.	Average of 6 years .	·8	10·7	156·3	167·8	1·7	11·5	172·8	186	1·2	13·8	198·3	213·3	·7	11	209·7	224·7	4·3	47	740·5	791·8
	Total Deaths	5	64	938	1007	10	69	1037	1116	7	83	1190	1280	4	66	1258	1348	26	282	4443	4751
Total Deaths . .		28	156	1632	1816	45	192	1918	2155	38	221	2250	2509	37	195	2217	2449	148	764	8017	8928

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It has been justly observed that "the standard in common use throughout Europe, of the numbers only and proportions of deaths to the population, when used only by itself, is often mischievously misleading," and that "the returns of the average age of death, which gives the average age and sum of vitality of each class, is the chief, the most correct, if not the only correct, standard for the measurement of the pressure of evils in the sanatory condition of the population." An evidence of the truth of the principle thus enunciated by Mr. Chadwick is furnished by table No. 2, which shows that, out of 100 deaths occurring in the year, 20·35, the lowest and most favourable quarterly proportion, in July, August, and September, coincide with the lowest and least favourable average duration of life, 18·75 years; and that, on the other hand, the season from January to April, which affords the highest average sum of life, 21·29 years, also gives the greatest number of deaths, 28·09. But a more striking illustration of the principle is furnished in the table No. 4; in the first columns of which it is shown that, in the corresponding quarters for two consecutive years, July to October, 1837 and 1838, the totals of deaths in each of the three classes coincide to a unit; but the average age at death in the former of these quarters, as shown in the third table, is only 16·72 years, and in the latter 23·73 years. The numbers of the first-class "gentry and professional men" are so small, that anything approaching to a law of mortality from them can scarcely be elicited, that is, as regards the average age of death. Taking the results of each year of the six separately, we find the average only 37·73 years in 1840-41, and 61·98 years in 1841-42; or, taking the extremes in the table relating to that class, we are presented with the very low average of 22·1 years in April, May, and June, 1839, and the very high one of 69·87 in July, August, and September, 1841. This discrepancy, as already intimated, arises from the paucity of the total number furnishing the data; so that the deaths of a few aged persons would immediately raise the average, and *vice versâ*. In the more numerous class of tradesmen and their families, the widest *variation* during the six years between any one year and another (1837-38 and 1840-41) amounts only to 5·67 years, and the *extremes* in the different seasons to 23·38 years; and it is to be observed that these extremes, relating to the middle class, occur in the same year, 1840-41, the lowest in the October quarter, the highest in the July quarter, showing a tendency to compensation or equilibrium. The yearly variation during the six years, of the third class, amounts to 4·08 years; and the extreme seasonal divergence is from 23·1 years in the April quarter of 1838, to 12·27 years in the July quarter, 1840, a difference of 10·83 years. These observations are comprised in the following table—

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Classes.	Extreme Yearly Variation.	Extreme Seasonal Variation.	Average Age at Death.
	Years.	Years.	Years.
First Class .	24·5	47·8	47·39
Second Class	5·67	23·38	31·63
Third Class .	4.08	10·83	18·28

The above small table shows that there is a greater amount of uncertainty in the average of life among the poor than among the middle class. The yearly variation of the second class (5·67 years) is much less, in respect to the average age of the class (31·63 years), than the yearly variation of the third class (4·08 years), in respect to the average age of the poorer class (18·28 years); that is, if the yearly variation in the age of persons whose sum of life averages 31½ years be five years and a-half, the yearly variation in the age of those whose sum averages 18¼ years should be about three years, instead of being what it appears to be—four years. This greater uncertainty of life is attributable to the occasional ravages made among the children of the poor by disorders, which are more fatal among them than among those who are nursed in sickness with solicitude and judgment. The year 1840-41 was marked by a great fatality among the children of the poor. Scarlet fever, during that time, to use the language of a medical gentleman in extensive practice, "was more like a plague in its virulence and frequency." By a table of particulars furnished to Dr. Playfair it appears that, in the year ending June 30th, 1841, 200 children under five years old died of this disease; while small-pox, hooping cough, and measles carried off respectively 66, 37, and 23.

In the fourth table, Mr. Cartwright has given the actual number of deaths during the six years, distinguishing as before, the three classes of persons, and the four quarters of the year. The table requires no remark unless indeed it be necessary to state, that the coincidence, already referred to, between the figures at the head of the column for the July and October quarter is a real one.

In table 5, Mr. Cartwright has exhibited particulars similar to those of the previous one, but relating only to persons who have attained the age of 21.

It will be there seen that the chances of life among the three classes are brought nearer to an equality. Recurring to the third table for a moment, we see the difference of the average age at death in the three classes, infants and minors included, to be about 16 years between the tradesmen and the gentry, and 13 years between the operatives and tradesmen; but when the strong constitutions which have resisted the trials of infancy and youth begin to tell among the operatives, this difference is reduced to less than seven years between tradesmen and gentry, and little more than four years between operatives and tradesmen; and, now that 21 years

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are attained, the variation between any two years of the sexennial period, for all the classes combined, but for the peculiar circumstances of 1840-41, would scarcely exceed one year. The effect of season is visible, in the fifth table, in the higher rate of mortality during January, February, and March. It is in those months that the aged are removed, and their advanced years raise the average age at death for the time. It is worthy of remark, too, that this higher rate obtains in all classes. The result of this table is susceptible of a favourable comparison with certain returns for the metropolis, given by Mr. Chadwick, from which it appears that the average ages at death, of all above 21, were—

——	Gentlemen.	Tradesmen.	Labourers.
In the Metropolis . .	60	51	49
In Preston . . .	61	55	50

It is true that the general average in the metropolis is 53, and in Preston only 51 years; but this arises from the much larger proportion of the working class in Preston than in London. In the Metropolitan returns the paupers are given as a distinct class; in Preston they have been included in the third class. This, of course, will have no effect on the general average. Table No. 6 contains an account of the actual deaths after the attainment of 21 years. Comparing this table with the previous one, it becomes again evident that the increased mortality of 1840-1 is referable to children; a truth yet more strikingly apparent in Mr. Cartwright's seventh table — from which it is shown that, during the whole six years, the deaths of infants under five, as compared to all deaths above that age, are in the proportion of 47 to 41; that at one period (1841-2) they were in the more favourable proportion of 67 to 74; but that in the unhealthy seasons, they were, in 1840-1, 94 to 78, and, in the previous year, no less than 105 to 68. But, probably, the most important truth, made plain in this table, is, that the excessive infant mortality is chiefly manifested among the families of the working class. In the year most fatal to their children, the low proportion of infant death among the first class remains unaltered, and although the middle class, in that year, suffered a double amount of what they had undergone the year before, yet that increase is not so much above the average of the six years as the increase which relates to the third class: the increase of the second class in 1839-40, being about one-fourth above the six years average; and the increase of the third class being about one-third. Since the formation of the tables now treated of, a careful analysis has been made of all the deaths under five years of age during the six years. The result of the inquiry shows, that of the 4,751 deaths, which appear in the

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seventh table as taking place under that age, 3,616 occurred und two years old; and the age, in each instance, was, on the averag only 0·7 years, or about nine months; 1135 children died betwe two and five years old, whose average was 3·29 years, or thr years and something less than four months. The average age the whole is only 1·32 years, or one year and about four month Nothing can show more strikingly that the earliest periods existence are attended by a proportionate liability to death. It necessary, however, to observe the loss of infant life among the poo as contrasted with the same among the middle and first class, another view. The following presents the precise amount of th contrast:—

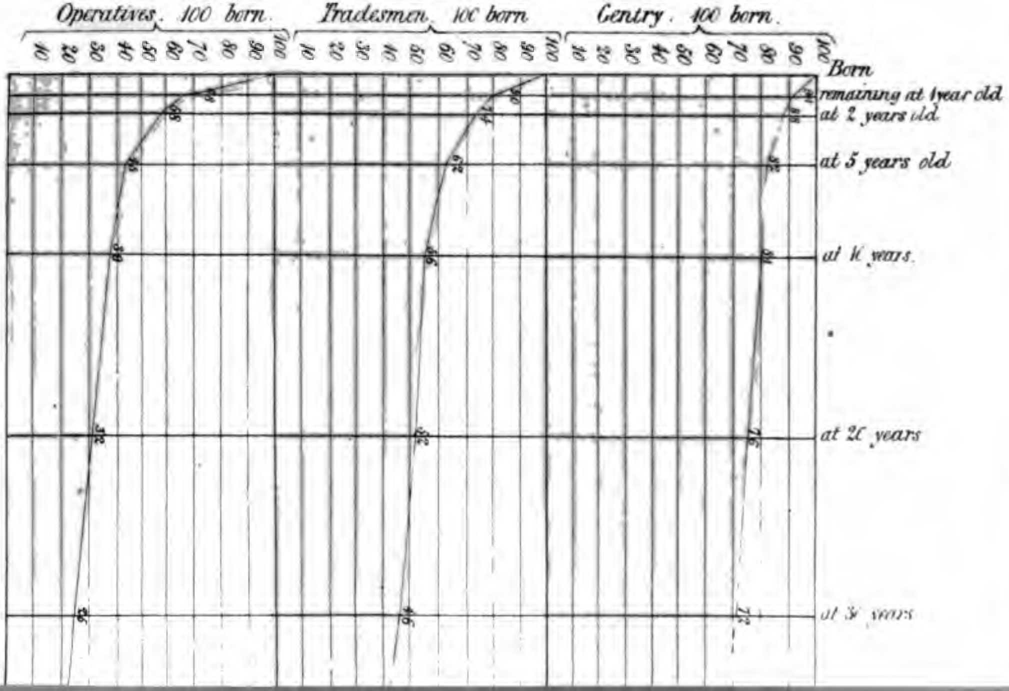
Classes.	Number of Deaths		Proportion of Deaths under 5 to those above 5.
	Under 5.	Above 5.	
1st Class	26	122	1 to 4·7
2nd Class	282	482	1 to 1·7
3rd Class	4,443	3,574	1 to 0·8
	4,751	4,178	1 to ·87

To place these facts in another light. If the infant population the working class could have been reared amidst the advantages food, air, attention, &c., which are afforded to the offspring of t upper class, during the last six years 3034 children would ha reached five years of age, who, as it is, have been prematur swept away by disease.

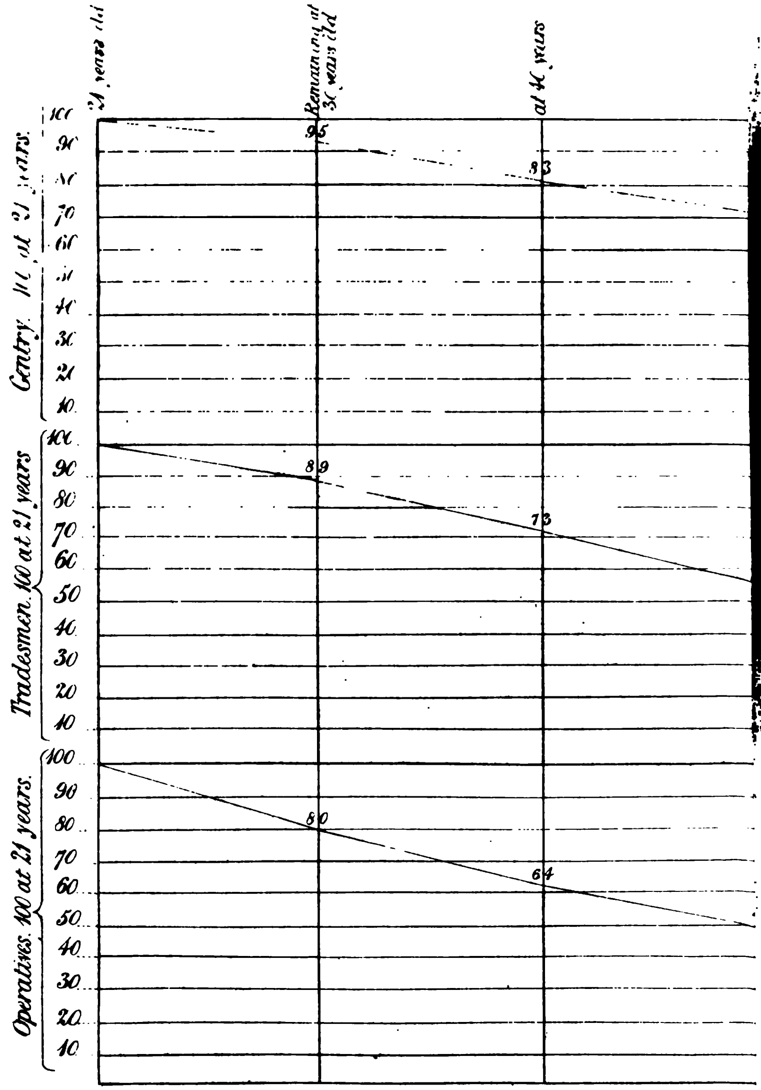
To show still further the great difference in the probabilities life, as respects the three classes now treated of, the following tal has been framed, showing the progressive decrease in the sum vitality in the three classes of the inhabitants of Preston. T calculations founded on the ages at death for the six years endi June 30, 1843:—

—	1. Gentry.	2. Tradesmen.	3. Operatives
Born	100	100	100
Remaining at the end of 1st year.	90·8	79·6	68·2
„ „ 2nd year.	87·6	73·5	57·5
„ „ 5th year.	82·4	61·8	44·6
„ „ 10th year.	81·1	56·6	38·8
„ „ 20th year.	76·3	51·6	31·5
„ „ 30th year.	72·3	45·9	25·2
„ „ 40th year.	63·4	37·5	20·4
„ „ 50th year.	56·	28·1	15·6
„ „ 60th year.	45·1	20·5	11·2
„ „ 70th year.	25·4	13·3	6·1
„ „ 80th year.	8·	4·5	2·1
„ „ 90th year.	1·3	·8	·2
„ „ 100th year.	..	..	·03
	Terminates in the 92nd year.	Terminates in the 96th year.	Terminates i the 103rd yea

The following table shows the progressive decrease in the vitali of the three classes from the age of 21 years:—



Shewing the perio
respective classes



Shewing the periodi
in the respective clas

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—	Gentry, &c.	Tradesmen, &c.	Operatives.
. . . . . .	100	100	100
ars old . . .	94·7	89·4	79·7
ars old . . .	83·2	73·2	63·7
ars old . . .	73·4	55·0	48·9
ars old . . .	59·1	40·4	34·6
ars old . . .	33·4	26·5	18·9
ars old . . .	10·8	9·6	7·1
ars old . .	1·6	1·5	1·1
ars old . . .	..	..	0·6
	Terminates at 92 years.	Terminates at 96 years.	Terminates at 103 years.

olved in the above numbers may be presented to re forcibly through the eye, and therefore two pany this Report, exhibiting the *streams of life* as three classes now adverted to. Looking at the strates the vital condition of the third class, it will ough the stream has been deprived of more than efore it has flowed through one-twentieth portion ich it actually runs; yet, after having sustained diminution, it then proceeds with a regularity not of the other streams, and finally reaches a point ir utmost limits. It may be well to bear in mind nce of centenarians in the third class alone is due, great number in that class (8017) which fur- for the calculation. According to the registers, longing to it, of more than a century old, died in the last six years, and of course they would pro- of existence in their class, although narrowed to ead, after it had entirely disappeared in the two vith numbers so much more circumscribed (148 proportionally fewer chances of the attainment of

table, No. 8, has been prepared by Mr. Cart- the ratio of mortality, as respects persons above years of age, in 1783, and the decennial periods 41 inclusive. Few remarks are called for on this hose which Mr. Cartwright has appended to it. owever, to the year 1831, and the coincidence ssive mortality of that year and the appearance of e kingdom, it may be observed, that although few sease were known in Preston, there is reason to ny were concealed, owing to the ignorant preju- r. If any value should be attached to this sup- lden rise in the average age at death will also be asmuch as the cholera generally attacked adults. of deaths to the population is not given in the fact, several circumstances interfere with the conditions in each year, and render it difficult to eral conclusions in that respect. The population

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of 1783 and of 1791 is uncertain. 1801 was a year of extreme distress; after 1814 the Parish Register did not contain the whole amount of burials; and 1841 was accompanied by an unusual mortality. If, however, we take the years 1791, 1811, and 1841, supposing the actual population of the first year to be about the amount stated, and calling the mortality of 1841, 1500, which is about the average of the sexennial period including it, the proportion of deaths to the population will stand thus :—

Years.	Population.	Deaths.	Proportion of Deaths to Population.
1791	8,000	178	1 to 45
1811	17,065	380	1 to 48
1841	50,131	1,500	1 to 33

The table now under observation (No. 8.) does not give so favourable a view of the sanatory state of Preston as might be expected when the town was "the resort and residence of persons of birth and polished manners." The average age at death was only 31·65 years, or eight years short of the standard given by the Carlisle table. But 60 years ago the probabilities of life, even among "persons of birth," were less favourable than they are now among the general class of the well informed. The ravages of small-pox were uncontrolled by vaccination, and disease generally was unchecked by the prudence and knowledge which educated persons now exercise for the preservation of the health of their children.

TABLE 8.

The Average AGE of DEATH, and Comparative MORTALITY of CHILDREN, in the Years 1783–1791, and the Five following Census Years, (calculated from the Preston Parish Church Registers). Showing that the Progressive Reduction of the Duration of Life and the Increase of Mortality among Children have been almost in inverse proportion to the increase of Population.

Years.	Average Age of Death.	Per Centage of Persons Dying		Number of Burials			Population.
		Above 5 Years old.	Under 5 Years old.	Above 5 Years old.	Under 5 Years old.	Total.	
1783	31·65	70·712	29·288	169	70	239	About 6,000
1791	28·609	55·057	44·943	98	80	178	About 8,000
1801	23·252	55·608	44·392	238	190	428	11,887
1811	19·998	48·685	51·315	185	195	380	17,065
1821	18·942	43·427	56·573	218	284	502	24,575
1831	23·39	67·79	32·210	481	230	711	33,112
1841	19·54	46·64	53·36	465	532	997	50,131
The following are from the Superintendent Registrar's Books :—							
1840-1	16·45	44·77	55.24	773	956	1,729	
1837–8 to 1842–3 Average of 6 Years.	19·6	46·68	53·32	696·3	791·8	1,488	

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"For many ages Preston took the lead of all the towns in the country as the resort and residence of persons of birth and polished manners." "A material change has taken place in some of these respects, within the last forty years, (from 1825,) by the introduction of the manufactures, and the claims of gentility have been materially abated by the presence of an active and enterprizing industry." The first small "factory" was built in 1777; and the population had, during the preceding century, fluctuated between 5,000 and 6,000. From 1791 to 1797 five other factories were erected by the late J. Horrocks, Esq., and from this period "the ratio of increase (of population) is scarcely to be equalled, even in this county, where men multiply faster than in any other portion of the kingdom."—*Baines' History of Lancashire.*

1783. The ages are not entered in the register for many years previous to this date.

1800 and 1801. Years of great distress. The mortality of Lancashire considerably above the usual average. The marriages in Preston were 23 per cent. lower than the average of the two preceding and two following years.

1814. The Roman Catholics began to inter in their own burial ground; and the parish church register of course does not contain all the deaths of the town after this period.

1831. The mortality of adults is considerably greater, and of children less, than what would appear to be the usual proportion. Some explanation has already been given of the increase of the average age of death in this year.

1840-1. This year has been most unfortunately chosen by the Commissioners for their calculations respecting the mortality of Preston; the average age of death being in that year 16·45 years, and the number of deaths 1729; while the average age of death for six years (from June, 1837, to July, 1843,) is 19·6 years, and the average number of deaths 1488.

The difference between the average age of those dying in 1841, as registered at the parish church, and those in the superintendent registrars' books for 1840-1, appears, in the above tables, so great as to require explanation. The number of deaths in the year ending 31st December, 1840, was most excessive, being no less than 1993, while the deaths in 1841 were only 1508, and the average of the six years was only 1488. It will be remembered that the registrar's year commences on the 1st July; and his year 1840-1 therefore includes the last six months of 1840, in which year the deaths of children under five years exceeded the average number of six years by 414; a fact which explains the low average age of 1840-1 (16½ years) as compared with that of 1841 (19½ years). Of the 1729 deaths in the registrar's books for 1840-1, upwards of 1100 appeared also in the registers of the parish church.

An argument in favour of the natural healthiness of Preston is to be found in the sanatory condition of the inmates of the House of

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Correction there. For more than five years the daily average number of prisoners has exceeded 219 (one-sixth of whom have been females), exclusive of infants who do not appear on the books, and who are generally about six in number. The average age of the 219 appears to have been 28·9 years. During the period mentioned, one death took place from a casualty, and only one from natural causes; the latter being the case of an aged female who was in a dying state when brought into the prison; this gives a ratio of mortality in the proportion of one death yearly to 547 persons. Now the mortality in the town of Preston for the five years ending June 30, 1843, has been proportionately 17 times as great as that which has taken place within the prison walls. In other words, if the ratio of mortality in the town had been the same as that in the prison, instead of 7767 deaths, only 457 would have been recorded. Or if, in the comparison, we place against the deaths in the prison those only in the town which take place after 21 years of age, and call them for the five years (see Table 6) 2556, we still have an excess of nearly 2000 deaths above what would have taken place had the same ratio obtained in the town which obtains in the prison.

The argument thus furnished by the sanatory condition of the Preston House of Correction is strengthened by comparing the mortality in that prison with others in the county; a comparison which may be shortly given as follows:—

Prisons.	Number of Years furnishing the Average.	Proportion of Deaths to Prisoners Annually.
	Years.	
Kirkdale . . .	4	1 to 62
Liverpool Borough	5	1 to 69
New Bailey . .	5	1 to 70
Lancaster Castle .	5	..
,, Criminals	..	1 to 90
,, Debtors .	..	1 to 75
Preston . . .	5	1 to 547

But there are many circumstances favourable to the general probability of life in a prison not existing in a town. The small proportion of the aged, the many vagrants with constitutions braced by fresh air; these and other facts tending to raise the general chances in favour of prison life, may not be fully counterpoised by the depressing effect of confinement and the weakened constitutions of many of the dissipated and profligate. But while it is admitted that the inmates of the gaol have, as a body, better chances of life than the general population, it should be borne in mind that those chances derive their greatest value from cleanliness, proper food, good air, regular hours and exercise, sobriety, and medical attention; all of which might be observed and obtained by the general mass of the people, if they would only strive to do for themselves what discipline and order do for the prisoners.

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In estimating the chances of life in Preston, with reference, 1. To airy and well-cleansed districts; 2. To districts only moderately cleansed and ventilated; and 3. To districts of the worst kind, where ventilation, cleansing, and drainage are ill provided for, or are altogether absent, it would have been desirable to obtain accurate returns of the deaths and ages in each district for a period of years. Time, however, has not permitted this; but the effect of locality on health may be shown with sufficient force by the following table, which applies to the whole town (deaths in the workhouse and house of recovery, and those which have been the subjects of coroners' inquests being excepted) for the year ending June 30, 1841.

Ages.	Well-conditioned Streets.		Moderately-conditioned Streets.		Ill-conditioned Streets.	
	Deaths.	Per Cent.	Deaths.	Per Cent.	Deaths.	Per Cent.
Under one year old .	21	15·5	158	20·8	250	38·3
Above one and under five years.	26	19·3	238	31·3	210	32·2
About five years old .	88	65·2	364	47·9	192	29·5
	135		760		652	

There is in the "lowest deep a lower deep;" and in the "districts of the worst kind" there are certain streets and courts, &c. the *worst* of the district. These have been most minutely and carefully examined by the agent of the Preston Charitable Society, a person well qualified by his intelligence for the task he has performed. The names of these streets, &c. are Canal-street, Back Canal-street, Hope-street, Holden's-square, Holden's-yard, Edward-street, Buckingham-street, Clarence-street, Poplar-street, Willow-street, Queen-street, and Savage's-court. In these streets, &c. the mortality for the year mentioned was as follows:—

Under one year old	56 or 44·4	per cent.
Above one year and under five years	37 „ 29·4	„
Above five years	33 „ 26·2	„
	126	

The population of these streets, &c., as ascertained by careful inquiry, is at present (October, 1843) 2400, which is probably pretty near what it was in 1840-1, the places having undergone since then little or no change. Assuming, then, this to be the population, we have deaths occurring, in that year, in the above-mentioned streets, in the proportion of 1 death to every 19 persons. For the whole of the town the deaths are 1 to every 29 persons.

It appears from the inquiries made (the particulars resulting from which are given in separate tables herewith) that there are many causes of disease and death operating in these worst conditioned streets simultaneously; yet most of them controllable by measures

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which a community fully alive to its social responsibilites, or even to the universal danger which at any moment may arise from those causes, would seek to employ or enforce. Those causes are such as usually exist wherever sickness and death prevail; defective ventilation, cleansing, and draining of streets; the same evils with regard to dwellings; the over-crowding of rooms and of beds; filthiness of apartments, persons, clothing, and bedding; prevalence of damp, yet want of water; absence of proper and decent accommodation as to privies; keeping of pigs in, or too near, dwellings; and, pervading all, sickening smells—signs of the presence of an atmosphere destructive of health to all who breathe it. As to ventilation, one court, Back Willow-street, is described as "closed at both ends by privies;" other courts and streets are "entered by passages under the houses;" others are "closed at one end by walls." As to cleansing, in Back Canal-street, "pigsties, middens, and privies form one side of the street." Buckingham-street "is swept every week by the police, but the cart cannot get down to carry the dirt away, which is swept into heaps and then left." "When any person goes to the Dispensary out of this street, the doctor tells them it is no wonder at there being sickness in that street." Other streets exhibit a still more abominable condition. Back Queen-street (south of Queen-street) is approached by several lobbies leading from Queen-street. A visitor, on entering the former, finds himself facing a row of privies of more than 100 yards long. The doors of the privies are about six feet from the house doors opposite; and the space between one privy and another is filled up with all imaginable and unimaginable filth; so that the street consists of a passage little more than six feet wide, with dwelling houses on one side, and a continuous range of necessaries, pigsties, middens, heaps of ashes, &c., &c.; on the other, with a filthy and sluggish surface drain running along one side. The doors opening into this street are, in some cases, the back doors of the Queen-street houses; but 12 houses have their *only* outlets—doors and windows—upon this disgusting and pestiferous passage. According to the returns for the year ending June 30, 1841, the deaths in Queen-street, Back Queen-street, and Queen-street Court, were for that year 36, or 1 death to 14·6 persons.*

In a cellar in King-street a few yards from the end of Queen-street, a poor female has been living for about 14 years, who is believed to be upwards of 102 years old. Her bodily and mental powers are, considering her age, remarkably vigorous. Her activity of limb is equal to that of many women of 50, and especially as regards her arms.† Her sight scarcely requires the aid of spectacles, and her hearing is but little impaired. Her hair is abundant and black. Her memory appears clear and prompt; and her disposition not merely cheerful but full of humour. A daughter, aged 70, lives with her, who looks, in her spectacles, almost as old as her parent. The cellar in which they live appears dry and warm; faces the end of a tolerably wide street, (Paradise-street,) and is altogether free from the very noxious circumstances which beset Queen-street. This case has been noticed here as confirmatory to a certain degree of an observation made by Mr. Chadwick. "It is a singular and yet unexplained fact, that centenarians are often found in the greatest proportion, in times and *places* where the average duration of life of the whole population is very low."*

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* A drain running near one end of Queen-street, and into which the "gas water" from a neighbouring factory is discharged, emits a most offensive and injurious effluvium. Dr. Lyon Playfair has been furnished with some silver coins, which became discoloured after 24 hours' exposure to this bad air on the chimney-piece of a house more peculiarly obnoxious from the emanations from it.

† The writer met her this day (22nd January) walking at the rate of nearly two

The streets, courts, and yards examined contain about 422 dwellings, inhabited at the time of the inquiry by 2400 persons sleeping in 852 beds, *i. e.*, an average of 5·68 inhabitants to each house, and 2·8 persons to each bed.

In 84 cases 4 persons slept in the same bed.
28 " 5 " "
13 " 6 " "
3 " 7 " "
1 " 8 " "
And, in addition, a family of 8 on bed stocks covered with a little straw.

Greatly injurious to health as this crowding into the same bed must be, it is scarcely requisite to intimate its equally powerful tendency to moral corruption. The tables appended to this Report record too many instances in which there is cause to apprehend the worst consequences in this respect.

It is not only among the poorest that small and ill-ventilated bed-rooms are contributing to disease, but also among many whose means would enable them to provide more wholesome chambers. The following case will illustrate the indifference on this point, which results from ignorance or habit, or both combined. A night-watchman to one of the principal mills having met with a serious accident, was taken home and there visited by the medical gentleman who has furnished this account. The sufferer's home or lodging was approached by a passage of 3 feet 2 in. wide, and the lodging itself consisted of a low room 6 feet 9½ in. long, and 4 feet 8½ in. wide, lighted by a pane of glass in the roof 9 in. square. The small bed which almost filled this wretched room was occupied alternately by the watchman, and an old man labouring under paralysis; the latter quitting the bed when the watchman returned from his nightly duties, and entering it again when vacated in the evening. The watchman was a single man, sober, and orderly in his conduct, and receiving regular wages of 18*s*. per week, a sum which would have enabled him to procure good lodgings and every attendant comfort.

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miles per hour, in company with her daughter, but supported only by her stick; "She did not feel quite so well, and therefore had come out for a walk."

* "*Inquiry into the Practice of Interments in Towns*," p. 12, note. See also "*Report on the Sanatory Condition of the Labouring Classes*," p. 176, note.

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A shoemaker, who, with his wife, could earn 25*s*. weekly, keeps a pig under the room in which he, his wife, and three children live. A sow belonging to a friend, having brought forth a more numerous litter than she could support, the shoemaker fitted up, for the reception of the two supernumerary pigs, a corner of his living room, in which they were found by the agent of the Charitable Society.

A map of the town has been made, shaded in those districts which are ill-ventilated, drained, and cleansed; the increased depth of tint indicating a proportionate degree of dirtiness, &c. The number of deaths in the respective streets is also given; every blue spot representing a death from fever or epidemic disease, and the red spots showing the frequency of deaths from other disorders. The residences of persons charged with offences during the last year are also indicated; and the whole tends to show that dirt, disease, and crime are concurrent.

From the statements made in this Report, it appears that the mortality of the town chiefly predominates among the children of the working classes, the mortality among them increasing as the social condition of the parents sinks. The filthiness, want of drainage, bad air, &c. already described, will account for very much of the infantile death; but there is reason to fear that in addition to those causes which are alike obnoxious to adult and infant health, there are others operating peculiarly against the latter. Most of these additional causes are connected with the ignorance, indifference, neglect, or selfishness of the parents. Their ignorance leads them to give to their offspring the most improper food, even when they are able to procure for them wholesome sustenance; and too often the child is destroyed by the gin poured into it with the intention to "nourish" it. It is ignorance, too, which blinds the parent to the necessity of care and caution in nursing such complaints as measles. When the measles are "out," and the little patients should be kept warm, they may be seen, as the writer has seen them, exposed to the fatal winds of December or January. The neglect of, or indifference to, children's health by the poor is evinced in a very marked manner by the records of the dispensary.

Mr. Holden, one of the honorary surgeons to that institution, has minutely investigated its statistics for the year ending October 21, 1840, during which period accurate memoranda were preserved; and the result of his inquiry shows a great discrepancy between the amount of deaths under five years old, as recorded in the books of the institution, and the amount of similar deaths among the poor as registered; a discrepancy which gives occasion to apprehend that the gratuitous advantages provided for them in sickness have not been made available for their children to a due extent. From Mr. Holden's statement accompanying this Report, it appears that the average age of deaths among dispensary patients reaches almost 25 years, while, as seen in Mr. Cartwright's tables, the average age of the operative class is only 18·28 years. The

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variation between the ages at death, in dispensary patients and in the operative class generally, is shown in the following table:—

Centesimal Proportion of Deaths in

Dispensary Patients for the Year ending October 21, 1840.			The Class of Operatives as per Mr. Cartwright's Table, No. 1.	In the worst Streets visited by the Agent of the Charitable Society.	
		Per Cent.	Per Cent.	Per Cent.	
Under 1 year . . .	8·5	29·4	55·42	44·4	73·8
Between 1 and 5 years	20·9			29·4	
" 5 and 10 "	11·1	70·6	44·58	26·2	
" 10 and 20 "	14·4				
" 20 and 30 "	7·3				
" 30 and 40 "	9·2				
" 40 and 50 "	9·8				
" 50 and 60 "	7·8				
" 60 and 70 "	4·5				
" 70 and 80 "	4·5				
" 80 and 90 "	1·3				
Upwards of 90 "	0·7				

Now although the particulars relating to the dispensary patients and those relating to the "worst streets" are not for the same period, they are for similar periods, as regards the general prevalence of disease; and we find that while 44·4 per cent. of infantile death took place in the "worst streets," only 8·5 per cent. died under the cognizance of the medical officers of the dispensary! and yet, if the wretched inhabitants of these worst streets sought medical aid at all, they would seek it most likely where it could be obtained without charge. It is known that druggists are often resorted to for medicine and advice by the poor, and probably in some or many cases assistance from such quarters may have been obtained for sick children; but after making all allowances, it is to be feared that, among certain classes of the poor, a great amount of infant death takes place without anything worthy the name of medical assistance having been obtained or even sought.

If the druggist is sometimes applied to for the medicine which, with greater propriety and safety would be prescribed by the medical man, he is too often asked for compounds, which no medical man would prescribe, such as "Godfrey's Cordial," "Infants' Preservative," Soothing Syrup," "Mothers' Blessing," &c. Returns have been obtained from all, or almost all, the chemists and druggists in Preston, of the quantity of these mixtures sold by each; and it is due to those gentlemen to say that the information requested from them was furnished in the most prompt and obliging manner. It does not appear that any one particular druggist sells the extraordinary quantity of Godfrey's Cordial, &c., which has been heard of in other towns, but all vend the nostrums in question to a greater or less extent; and the aggregate of the whole quantity sold indicates that, allowing half an ounce per week to each family, upwards of 1600 families are in the habit of using "Godfrey's

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Cordial," or some other equally injurious compound. It is not the least melancholy feature in the general aspect of these facts that "Godfrey" (as it is familiarly called by its purchasers) is not given in ignorance of its noxious properties, a circumstance which the Charitable Society's agent had frequent occasion to notice. It is administered not so often, probably, by the mother, as by the nurse. The former, while working in the factory, intrusts her infant to an old woman or young girl, who may also have the charge of other infants; and this general nurse, in order to fulfil her task with as much ease to herself as possible, drugs the unfortunate babes with "Quietness." Mr. Robert Brown, surgeon, who collected much important information on this subject, had, among other communications made to him in writing, the following, which, although it may not at first appear very important, gives clear intimation of the obtaining medicine and advice from druggists,—of mothers leaving their children in the care of most improper nurses,—and of the general suspicion of the use of deleterious drugs:—

"A child was brought to me for a little aperient medicine; the mother suspected that the person who nursed it had been in the habit of giving it some narcotic. It had not had more than two or three motions for the space of three weeks. I advised the mother to stay at home and attend to it herself. The advice was followed, and the child recovered in a few days."

Another highly respectable chemist and druggist writes,—

"A woman brought a bottle to me containing some medicine for examination, which was found to be an infusion of opium. She said a neighbour had given some of it to one of her children, upon the recommendation of some quack, who was in the habit of calling upon poor families for the purpose of selling the medicine. Her child became stupified in half an hour, and ultimately died. The man denied that the death was the effect of the medicine, as he had a very extensive sale, and could bring many proofs of the good resulting from its use."

The apathy, or ignorance, or prejudice of parents among the poor, has also been evinced in regard to the small pox. Mr. Haldane, who filled the office of house surgeon to the dispensary for about six years, has obligingly furnished, on this point, some information, rendered valuable by his intimate knowledge of the poor, and his activity and ability in the promotion of their health. He states that the first case of small pox admitted in the books of the dispensary, within his knowledge, was in January, 1838. By Midsummer of that year, the disease had rapidly increased, both as regarded the numbers attacked and the severity of the symptoms.

"The disease continued through 1839 and 1840, during which time many hundreds of children must have suffered from it. In 1841 it began to subside. Previous to 1838 very few of the poorer class of children in the town had been vaccinated, though it was well known that all children brought to the dispensary for the purpose of being vaccinated would have the operation performed without any charge. Of the numbers taking advantage of this in 1838 I do not think there were a dozen; in 1839 there

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were 35; in 1840, 44. At this time I was appointed by the Board of Guardians vaccinator to the town, and as I knew it would be in vain expecting parents to bring their children to the dispensary for vaccination, I performed the operation at their own houses, very frequently having to combat objections raised by the parents. In 1841, I vaccinated 468; in 1842, 204; in the present year, 326."

Messrs. Harrison and Ewings have instituted a careful and most elaborate inquiry into the circumstances influencing the health of the families of 749 married men employed in factories. Although those gentlemen regret the insufficiency or inaccuracy of the returns they have obtained, yet there are many facts ascertained which are of much importance. There appear to be about 4·7 persons, on an average, in each family; sickness remains in a family about 17 days, or with an individual four days, yearly. The average age of the fathers of families scarcely exceeds 35 years; their average age at marriage was but little more than 23 years. In each family there are, on an average, about 2·7 children living, and 1·6 removed by death; and of those children so removed 76 per cent. died under five years old. Those operatives receiving the highest wages, "dressers," appear to have the most numerous families, and their loss by infantile death has been only 62·2 per cent. The men had been married on an average only 12·2 years. This short duration of married life will in a great measure account for the high proportion of infantile mortality. Where deaths do occur in families such as those now adverted to, the age at death will necessarily be limited to a period ranging from new-born infancy to about 11 years, and the probabilities of death, which are up to a certain point in an inverse ratio to advancing age, are scarcely fulfilled, when, as in the case before us, of 100 children dying under 11½ years, 76 have died under five years. This amount of infant mortality, which will at first be startling, will assume a more favourable appearance on a comparison with the infant mortality of the kingdom generally. By a table given in the "Companion to the Almanac" for 1840, p. 51, it appears that of all the deaths registered in England and Wales in 1839, 39·1 per cent. took place under five years of age, and 7·2 per cent. between 5 and 14. But restricting the inquiry to children under 15, out of 100 dying under that age, no less than 84 died below five years old. The absolute amount of mortality in the families under consideration, or the number of children removed by death in comparison with those spared, appears to be in the proportion of 16 to 27, or of 43 born 16 die before reaching the age of 11 or 12 years; this is undoubtedly a much higher ratio than that which exists among families of a superior class, and it is to be regretted that we have not the means of making an accurate comparison of the two classes. It is sufficiently evident, however, that the sanatory condition of the families now under consideration contrasts favourably with that of the working class generally. May

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not this better condition be mainly attributable to the circumstance of most of these young families having the benefit, imperfect as it may be, of a mother's superintendence? Only 133 mothers seem to be working. The imprudence of the labouring class is visible in the facts recorded by Messrs. Ewings and Harrison as to the very early marriages of 90 out of the 749 men; four of them were only children of 16 when they contracted that engagement.

Great pains have been taken by Mr. Holden to collect information relating to the management and statistics of the sick-clubs in Preston. There is much reserve, however, in giving such information, and consequently less has been acquired than would have been desirable for the purpose of forming any general conclusions as to operations and value. The following summary, circumscribed as it is, is sufficient to manifest the widely different amounts of sickness, and rates of payment, existing in only 11 clubs. The table relates to the year ending July 1, 1843:—

——	Total Members.	Sick during Year.		Average Period of Sickness in Weeks.	Average Payment to each Sick Person.		
		Members.	Per Centage.		£	s.	d.
Tee-total	37	2	5·4	3·	1	10	0
Managers	47	5	10·6	8·2	4	2	0
Worthy	80	12	15·	7·5	3	7	8
Rechabites	116	19	16·3	3·7	1	17	7
Odd Fellows	689	124	18·	4·	2	0	0
Female Rechabites	30	6	20·	3·3	1	0	0
Foresters	230	52	22·6	8·8	2	11	0
Ebenezer	111	28	25·2	..	3	7	6
Catholic Beneficent	167	51	30·6	10·	2	19	3
Ditto, female	80	25	31·2	9·	1	13	10
Perseverance	58	20	34·4	6·1	2	7	11
	1645	344	20·9				

There is one circumstance apparent in the above table, which adds further proof of the value of temperate habits among the poor. The Tee-total Society (of which, however, the numbers are rather small for the purpose of any general deduction) presents not merely the smallest proportion of sick, but a proportion amounting to little more than one-half of that next most favourable, while at the same time its members suffer the shortest average duration of illness. The extremes in the amount of sickness, as shown by the proportion of sick members pressing in their respective societies, are very striking, being only 5·4 per cent. in the Tee-total Society, and 34·4 per cent. in the Perseverance. The Rechabites, who might be expected to occupy a creditable place near the Tee-totallers, are not, in all cases, as appears from the Returns, worthy of the name they assume.

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Most of the sick-clubs are also burial-clubs; that is, a certain sum, varying from 2*l.* to 10*l.*, is allowed on the death of a member. There are also in Preston seven societies acting only as burial-clubs, but acting as such very extensively. Papers sent in to the secretaries to three of these clubs accompany this Report* From them it appears that the present members belonging to the three societies are upwards of 23,400! and that the aggregate sum expended by them in funerals, or rather paid to claimants, amounts to 2460*l.* yearly. In only one return are any particulars given as to the age or death of parties entered as members, and from that it appears that 64 per

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* The collector to a burial-club, containing upwards of 5000 members,—a man whose intelligence is greatly superior to his rank in life, states, that while he believes such societies to be productive of much general benefit, he knows several instances in which they have been much abused. He is acquainted with cases in which *hired nurses* have speculated on the lives of infants committed to their care, by entering them into the clubs. Within the last few days, two young women proposed to him to enter a child into the society in which he holds office, offering to pay the weekly premium alternately. Upon inquiry, in conformity with his usual custom, as to the relation subsisting between them and the child, he learned that the child's mother was dead; and that *the infant itself was placed at nurse with the mother of one of these young women.* He also detailed the particulars of the case of an illegitimate child, which, having been in the care of its maternal grandmother, was removed, on her death, to the house of its father's relatives. Within a week of that removal, the child died, (although, previously, it appeared to be in strong health,) and under such circumstances as induced him not only to refuse payment of the burial money from his club, but also to make such a representation of the affair to the officers of another club in which the child had been ensured, as led them to make a similar refusal. No attempt was made to compel payment from either society.

The same "*collector*" has kindly furnished an account of the ages at death of 400 members of the society to which he belongs, being the number removed by death during the last three years and three months :—

Under 12 months old	69	17·22	62
From 1 year to 2 years old . .	79	19·77	
2 years to 3 „ . .	52	13·	
3 „ to 4 „ . .	28	7·	
4 „ to 5 „ . .	20	5·	
5 „ to 10 „ . .	36	9·	38
10 „ to 20 „ . .	23	5·77	
20 „ to 30 „ . .	17	4·22	
30 „ to 40 „ . .	23	5·77	
40 „ to 50 „ . .	25	6·22	
50 „ to 60 „ . .	14	3·5	
60 „ to 70 „ . .	10	2·5	
70 „ to 80 „ . .	4	1·	

In consequence of a suggestion made to him, the same person states it to be his opinion, that much advantage would be found by the adoption of a plan tending to increase the solicitude for the preservation of infant life; by which plan, a small weekly payment, commencing at or soon after birth, and continued for 10, 12, 13, or more years, should ensure a liberal allowance for one, two, or three years, at a time when education would be most valuable to the child, and the necessity for sending it to the factory would, in a great measure be obviated.

It is also admitted by the same authority, that a great improvement would be effected, if, instead of *money* being paid by the club at the death of a member, the funeral were undertaken by the society, and performed in a solemn and appropriate manner; but, nevertheless, to effect this, it would be necessary that *all* the burial societies should adopt the plan. Were only one or two to act upon it, ensurances would soon be withdrawn from them, and transferred to those societies in which the old system of money payments was continued.

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cent. of those members die under five years old. The Returns do not afford the means of comparing this high per centage with that of the operative class generally. There are other circumstances connected with the operation of these clubs suggesting matter for grave consideration and inquiry. The same person may be entered into every society. The respectable secretary to one of the societies states that he knows several instances in which the same person is on the books of three clubs. Thus, on the death of a child, the parent or other ensurer may receive 16*l.* 6*s.* 6*d.*, (according to the payments of the three clubs now referred to,) while the expense of interment with all befitting propriety should not exceed, and in fact seldom amounts to, 3*l.* There is no restriction in any of the societies as to the admission of illegitimate children. If the weekly penny or halfpenny is paid for the stipulated period by either mother or father, he or she is entitled, on the demise of the ensured, to all the benefits which the society promises. The burial-clubs enroll 12 or 15 times as many members as the sick-clubs, inducing the inference that the prospect to a poor person of support and assistance in illness is less desirable than the possession of 5*l.*, 10*l.*, or 15*l.* on the decease of his child. Such a sum, too, being a larger one than the insurer, in most cases, ever before possessed at one time, or ever could hope to possess except from such a contingency as that adverted to. Burial-societies are, no doubt, susceptible of highly beneficial operation, especially as ensuring the lives of fathers of families; and it is right to speak with reserve of their tendencies, in the absence of all positive proof of their injurious effects; but the facts above mentioned will be, to some minds, suggestive of painful ideas. When an ensured child is attacked by sickness, the feelings created by the anticipated payment from the burial-club, should it die, may sometimes be stronger than the anxieties for the preservation of its life. A respectable collector of cottage rents states in writing,—

> "That he often fails to obtain the rent from cottagers, in consequence of sickness. The sickness of children is most commonly assigned as a reason for the non-payment. Almost all the children in families where he collects are members of burial societies, most commonly are subscribers of 1*d.* a-week each child. The children of the poor are, when sick, greatly neglected, and lost from want of due attention to cleanliness; and the poor seldom seek medical assistance for sick children except when on the point of death. One poor child, living in —— street, the son of Thomas ——, sits in a chair, or lies in a corner of a room, upon some bags of rags, without any covering upon him, and entirely neglected, both as regards nursing and medical relief. Such cases he is constantly witnessing."

Another collector of cottage rents states, "The poor people have often told me that they were unable to pay at that time; but when a certain member of the family,—generally a child,—died, they would be able to pay. I have felt much shocked at this, and I have told the people that it was very wrong to depend upon anything of the kind. Most of the children at the houses which I visit are in burial-clubs." A lady, a friend of the author of this Report, states, that a young woman, whose services she required as a wet nurse, having a child ill, she offered to send her own medical friend to attend to it. The reply of the nurse was,—"Oh! never mind, ma'am, it's in two burial-clubs!"

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Returns have been furnished by the respectable and intelligent officers of the "Preston Original Legal Friendly Burial Society, established 31st December, 1831." From these returns the following table is formed :—

Children between Two Months and Five Years Old.

Entered.		Actual Number on the Books.	Average Number on the Books during the Year.	Died.				Per Cent. on all the Deaths.
Years ending December 31st,	Number of Children.			Payable.	Per Cent.	Not Payable.*	Per Cent.	
1840	..	2,413	..	..	..	..	..	..
1841	1,515	2,842	2,627	167	6·35	40	1·52	7·87
1842	1,467	3,292	3,067	202	6·58	64	1·76	8·34
1843	1,549	4,140	3,716	253	6·81	32	0·86	7·67
		..	9,410	622	..	126	..	..
Average of three years . . .		..	3,137	207	6·6	42	1·4	8·0

* Having died within 16 weeks of entrance.

The following table shows the progressive increase of members since December 31, 1840 :—

Years ending December 31st,	Under Five Years.		Above Five Years.		Total Members.
	Members.	Increase.	Members.	Increase or Decrease.	
1840	2,413	..	11,489	..	13,902
1841	2,842	429	12,675	+ 1,186	15,517
1842	3,292	450	12,708	+ 33	16,000
1843	4,140	848	12,560	— 148	16,700

The rules of the society prohibit entrance before the completion of eight weeks of age, and also after 55 years. They also exclude all persons who may "have any disorder or complaint upon them;" . . . "and in no case shall any member receive any benefit from this society unless 16 clear payments (weekly) to the fund have been made previous to the day of their death."

In the last printed report of the society it is stated that at the close of 1843 the number of members was 16,700, and the funerals, during the year, 469. Calculating upon the mean of the number of members between December, 1842, and December, 1843 (16,350), this mortality is about 2·9 per cent. The table has shown the mortality of infants in the society, for 1843, to be 6·8 per cent., and it remains to be stated that the mortality among the members above five years (the mean of that portion of the society being 12,634, and the deaths being 216) is 1·7 per

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cent.; and that the general mortality of the society for 1843 (469 deaths "payable" + 32 "not payable" = 501) is 3 per cent.

The mortality of Preston has been already stated at 2·97 per cent. But this mortality includes a class of infants inadmissible to the burial societies, viz., those under nine weeks old, and also of adults beyond 67 years (55 years, limit of admission + 12 years, age of the club). In order, therefore, to compare the mortality of the society with that of the town, we must deduct from the latter the deaths under nine weeks and above 67 years: thus,

Total Annual Deaths.		Under 9 Weeks.		Above 67 Years.		
1488	—	(170	+	125)	=	1193 deaths, = 2·4 per cent. on a population of 50,000.

In this view the mortality of the burial society exceeds that of the general population by 0·6 per cent.; or, for 4 deaths in the town, there are 5 in the society.

In pursuing the comparison now attempted, many other considerations must be taken into account. On the one hand, sick and weakly persons are not admitted into the society, and the members who are above 5 years of age must consist chiefly of persons from 6 to 19 years old; on the other hand, the general mortality of the society will be much affected by the large proportion of infant members, one-fourth of the whole.

Assuming, as we may, that the deaths in the society "not payable" appertain almost solely to children dying before "16 clear payments have been made for them,"—*i. e.*, to children between two and six months old, a comparison, as regards this class of children, between the town and the society may be thus given:—

> Annual average of deaths in the town (excluding those under 2 months and above 67 years) 1193:—deaths between 2 and 6 months, 125 = 10·4 per cent. on all the *deaths*.
>
> Deaths in the club for 1843, 501; deaths between 2 and 6 months, 32 = 6·4 per cent.

A difference of this kind, though not perhaps to this extent, might be expected. The children entered into the society are, in a great measure, select lives; and, during the 16 *weeks*, they are sure to receive as much attention as can be bestowed upon them; while, on the contrary, the uninsured children will include all the weakly and precarious lives rejected by the societies.

The total of infant deaths in the society is, according to the table, 8 per cent. on all the children entered.

The deaths in the general population, of the same class of children (between two months and five years) have been, on the average of the last six years, 629 annually. The census of 1841 stated the children under five to be 6885; and if we take from that number 300 as the proportion under two months old,—a deduction greater, probably, than the facts would require, we have a mortality (629 deaths in 6585 children) at 9·6 per cent. Having seen that infants dying in the town between two and six months are 10·4 per cent. in all the infant deaths, while the same deaths in the society are only 6·4 per cent., we should be led to expect that a similar proportion would appear when infant deaths from two months to five years in the town are compared with those of the society; the non-insured comprising the poorest and sickliest, and the insured being more choice lives, and that the facts would probably be represented thus:—

Mortality between Two and Six Months, calculated on Infant Deaths.				Mortality between Two Months and Five Years, calculated on Infant Population.		
Town.		Society.		Town.		Society.
As 10·4	:	6·4	::	9·6	:	5·9

But the mortality of the society, instead of appearing as above, 5·9 per cent., is 8· per cent.!

The members of this burial society forming so large a portion of the whole population, it may be desirable to separate them from the general mass, and compare the mortality of the two parts respectively for the year 1843, estimating the population at 52,500, and taking the mortality from the table:—

Members of burial society	16,700	Deaths	501	= 3 per cent.
Remaining population	36,150	,,	996	= 2·75 per cent.
	52,500		1,497	

Let it be borne in mind that, although the society has a very large proportion of infant members to account for its excessive mortality, the remaining population comprises all infants under two months, all the sick and ailing inadmissible to the society, and all those whose age exceeds between 60 and 70 years.

In 1841, the children in Preston under five amounted to 6885; they may now be calculated at 7200. If from this latter number are deducted those under two months old (300), the children unlikely, from their station, to be entered into any club (800), and also sickly children, together with the offspring of the very lowest class (500), there remain 5600 children eligible to burial clubs, of whom two-thirds are entered in this club alone.

In glancing at the second table now given, it will be observed that the society in question has, latterly, derived its increase from children alone. The adults have already been entered; and henceforward children only will constitute the new members.

From the data already obtained relative to burial clubs, it is suggested that it would be desirable to obtain still further details. The writer has, in all cases, found the officers of the burial societies intelligent, respectable, and willing to afford any information which may be desired, and very anxious to place their societies upon a footing which shall hold out no temptation to abuse their advantages.

The following is presented as giving a proximate estimate of the expense to be incurred, and of the saving derivable from sanatory improvements in Preston:—

Estimate of Expenditure.

As regards a full supply of water, it will be unnecessary to advert to the cost of mains, as that is defrayed by the Water-works Company.

1. There are about 5000 houses still unsupplied with water. This may be remedied at a cost of 10*s.* for each house = 2500*l.*

2. The extent of sewerage yet required would comprise about 2500 yards of main sewer four feet diameter, which, at 20*s.* per yard, would amount to 2500*l.*; 23,759 yards of 2 feet 6 inches by 2 feet, at 9*s.* per yard, 10,691*l.*; 23,759 yards of 2 feet by 1 foot 6 inches, at 7*s.* 6*d.* per yard, 8908*l.* The cost of the main sewer would be charged on the *whole* town by a rate of 5*s.* for each house. The cost of the secondary sewers would be charged on those houses not yet provided with them, being 7919; which, at 49*s.* 6*d.* each house, would amount to 19,599*l.*, the cost specified above.

3. It may be considered that proper house drainage is wanted for the whole town. The average length of drainage for each house would be about 12 yards; and the cost 1*s.* 3*d.* per yard = 7500*l.*

4. Various calculations have been made as to the expense of fitting up a cheap, but efficient apparatus in the nature of a water-closet. The cost for the *whole town*, supposing that many houses would require something of a more expensive kind than that which would suffice for the poorer tenements, may be reckoned,—supposing that a large number are fitted up at the same time and on the same plan,—at 2*l.* for each house = 20,000*l.*

5. With regard to ventilation, and the cost of effecting it, it is clear that the simple and cheap plan of Mr. Toynbee would serve the desired end; and that a most important sanatory improvement may be wrought at an expense very trifling indeed, when compared with its valuable results. The houses of the poor in Preston generally contain three or four rooms, more frequently the latter number: but supposing that Mr. Toynbee's plan were adopted in the houses of a somewhat better kind also, it may be calculated that 10,000 houses, containing on an average five rooms each, would require ventilation at a cost of 3*s.* for each room; 10,000 × 5 × 3*s.* = 7500*l.*

6. The cost of street sweeping, although not involving, as in other improvements, a sinking of capital, would constitute a considerable annual outlay, if the work were performed efficiently,

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which outlay should enter into the estimate of expenditure for improvement.

In many parts of the town where the best houses are situated, the traffic is so infrequent that the aid of the scavenger would be little required. The total *length* to be swept may be estimated at 15 miles, and the average breadth at 7 yards; or, in round numbers, about 185,000 square yards. To sweep this extent of pavement, it may be supposed that 185 men would be required; and the number of days on which they would be employed, deducting Sundays, and days when their labour would be impracticable or unnecessary, would not exceed 250 in the year. Wages being estimated at 2*s*. per man per day, the annual cost of sweeping the town would be 4625*l*., which would be (in the *whole* year) about 12*l*. 13*s*. 5*d*. daily, or 9*s*. 3*d*. for each house per year, or a little more than 2*d*. per house per week.

Estimate of Saving, &c.

1. The first and most obvious benefit and saving to arise from efficient sanatory measures, are connected with human life. It has already been shown that the average number of deaths annually taking place in Preston are 1488; and adopting the supposition that one-third of these would be prevented by due care and precaution (a supposition certainly much within the probabilities of the case), and that the expense attending each death is 2*l*. 10*s*. (a sum much less than the average amount paid for each funeral by the burial clubs), the deaths prevented annually would be 496, and the money saved would amount to 1240*l*.*

2. The next item of saving is in respect to *births*. It has been fully established that a large proportion of births to population is a certain attendant upon a low sanatory condition. The births in Preston are 1 in 26, instead of being in the more healthy ratio of 1 in 44. The excess of births, annually, is therefore 827; and the annual saving to the town by the institution of measures to obviate this excess, would be, at least, as many pounds sterling.

3. The investigations of Messrs. Harrison and Ewings into the condition of married men in factories, showed that the average duration of sickness with each individual is about four days yearly. Among the superior classes the period of sickness will be less, but in the lowest of the population it will be greater; so that for the whole population four days' sickness to each individual may be taken as the average; 50,131 inhabitants × 4 days = 200,524 days lost by sickness. The population under 13 years of age may be estimated at 16,100, and the remainder at about 34,050. Considering the loss on the sickness of the children to arise only from the expense of medicine (though the sickness of the child must

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* The printed reports of two burial societies, just published, give an aggregate of 540 funerals, costing 2167*l*. 8*s*. = 4*l*. 0*s*. 7¾*d*. for each.

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often cause a loss of employ and wages to the mother) that loss in money may be reckoned at 3*s*. for each case, or 16,100 + 3*s*. = 2415*l*. The loss attending the sickness of the older portion will involve a loss of employ as well as the expense of medical aid; and reckoning in each instance 3*s*. for medicine, &c., and 8*s*. for loss of wages, the whole loss is (34,050 + 11*s*. =) 18,727*l*.

Under an improved sanatory system one-third at least of the duration of sickness, and one-third also of its attendant expense, would be saved; that is (200,524 ÷ 3 =) 66,841 days, or 16,710 cases, and (2,415*l*. + 18,727*l*. ÷ 3 =) 7,047*l*. 6*s*. 8*d*. in money.

4. The books of the relieving officer of the Preston Union have been carefully examined in order to ascertain the sum expended in the maintenance of widows and orphans chargeable to the borough for the year ending December 31, 1843. This sum amounts to 1002*l*. 12*s*. 3*d*. It is assumed that a better order of things would diminish the widowhood and orphanage by one-half, and so cause a saving in this respect of 501*l*. 6*s*. 1*d*.; and it must be remembered that this saving is irrespective of what would be produced in public and private charity. Were that also taken into account, the estimate of saving should be doubled.

5. By adopting precautions which would render the supply of water in the mains available in one minute throughout the *whole* town—as it already is to a great extent—a saving of insurance would be realized, which, at 6*s*. per house for half the number of houses, would amount to 1500*l*.

6. The drainage of the town, to a certain extent, is at present carried into the river and lost; but a complete system of sewerage, which should make all the refuse available as productive manure, is practicable, and would, if effected, work a saving, calculated at 10*s*. per head on the whole population, of about 25,000*l*.

The smoke from the factories is consumed in only two instances, and in both of them Parke's plan is adopted. This plan, although not completely effective, is so far valuable, that were all the factories of the town to use it, an annual saving in the washing of clothing, &c., would take place to the extent of 1*d*. per head per week; that is, of 208*l*. 17*s*. per week, or 10,450*l*. 4*s*. per year. Mr. William Elsworth, the able and experienced engineer, superintending Messrs. Horrocks and Millers' factories, states that the adoption of Parke's plan, in fitting up the boiler, &c., does not involve an additional expense of more than 5*l*. The saving in coal, as tested by more than 20 years' experience, is 7 per cent.; two tons of coal produce only four pounds of ashes; and during eight hours out of the twelve the smoke is perfectly consumed.

Besides the saving in respect to washing and painting which would ensue from the consumption of factory smoke, another would arise in regard to the land near the town, occupied by market gardeners. A considerable extent of such land lies close to the town on its south-west side, and the wind never brings the

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factory smoke to it so as to cause injury; the garden land on the opposite, or north-east, side of the town is to a certain extent affected by the smoke carried thither by the prevalent west and south-west winds, so that although it does not prevent the growth of market vegetables, additional labour is required in washing them free from the smoke and soot which falls upon them. The prejudicial effect of smoke is more visible upon shrubs and trees which retain their leaves for a long period. The land on the south-west is of a somewhat better kind, and that circumstance, combined with the absence of factory smoke, will make its yearly value 3*l.* per acre more than the ground on the north-east.

The annual saving in productive manure appears to be estimated at a very large amount. It is in fact based, not upon any actual experiments or calculations instituted for this locality, but upon general conclusions arrived at by Edwin Chadwick, Esq., and other gentlemen, who have given their attention to this subject. A glance, however, at the position of the town will enable any one to conceive that the application of a little engineering skill would render many hundred acres of low and level land in the immediate vicinity capable of benefiting by the drainage, which is now almost entirely wasted. Some small fields on the south-west are occasionally covered with the contents of one of the sewers, which, not being sufficiently diluted, are productive of annoyance to the inhabitants of the neighbouring houses. In another quarter five or six acres are irrigated by drainage in a much more diluted condition; and no complaints are made of smell or other inconvenience arising from the practice. The land itself produces two crops of hay in the year, besides supplying a great abundance of green food.

8. Among the savings consequent on the general consumption of smoke, and by the removal or laying the dust in the streets, an estimate should be included of that which would arise from the less frequent occasion of outside painting of shops and houses.

The cost of painting the humblest kind of cottages varies from	3*s.* to 6*s.*
Houses of 10*l.* rental cost from	6*s.* to 10*s.*
,, 20*l.* rental cost from	16*s.* to 40*s.*
,, 30*l.* to 50*l.* cost from	3*l.* to 10*l.*
,, upwards of 50*l.* cost from . . .	12*l.* to 25*l.*

Upon the whole, 25*s.* as the cost of outside painting of each house in the town may be considered a low estimate; that is, 10,000 × 25*s.* = 12,500*l.*; and as this painting takes place, to use the words of a tradesman extensively employed in the business, "every three years for preservation of wood-work, and every two years for cleanliness," the sum above named may be regarded as about equivalent to 5000*l.* yearly; and of this, one-fourth, or 1250*l.*, might be saved.

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The following is a summary of the foregoing estimates :—

I.—Proximate Estimate of Expenditure.

———	Total Number of Houses.	A. Cost per House for Capital.			B. Rent per House.		C. Total Outlay.	D. Total Increased Rental required defraying by Annual Instalments of Principal and Interest of 20 Years for the House cleansing and Water Apparatus, and 30 Years for Sewers and Drains.		
		£.	s.	d.	s.	d.	£.	£.	s.	d.
1. In want of water	5,000	0	10	0	0	6	2,500	200	15	0
2. ,, main sewer .	10,000	0	5	0	0	2	2,500	162	12	6
secondary do. .	7,919	2	9	6	2	6	19,599	1,274	18	9
3. ,, house-drains .	10,000	0	15	0	0	9	7,500	487	17	9
4. ,, water closets .	10,000	2	0	0	2	0	20,000	1,606	1	0
5. ,, ventilation .	10,000	0	15	0	0	9	7,500	602	4	6
6. ,, street-sweeping	10,000	.		.	9	3	..	4,625	0	0

	£.	s.	d.
Total immediate expenditure of capital required for the improvement of the town	51,599	0	0
Total increased rental (including the annual expense of street-sweeping)	8,959	9	8
Immediate expenditure for each house	5	19	3
Total increased annual rent for each house	0	15	11
Total increased weekly rent for each house	0	0	$3\frac{2}{3}$
Immediate expenditure per head of the population	1	3	9
Annual expenditure per head of the population	0	3	$6\frac{1}{2}$
Weekly expenditure per head of the population	0	0	$0\frac{3}{4}\frac{14}{52}$

From the foregoing statements, it must be concluded that, while on the one hand Preston possesses, in its air, soil, and position, advantages of a superior kind, on the other there are many and heavy causes at work, pressing upon the general vitality of its inhabitants, and shortening their term of existence before its course has been half run. We have seen that the wealthy, who live in the best cleansed and best ventilated districts, have, from the time of birth, a probability of life extending to more than 47 years ; but that the poorest class,—surrounded by the miasmata generated in filth and putridity, crowded into rooms into which pure air never penetrates, and into beds utterly and in every way unfit for their purpose, with minds sunks in ignorance, and with affections (social and family) uncultivated, with their children exposed to the unrestrained influence of disease, improperly fed, and drugged with narcotics by ignorant and indolent nurses,—have their chances of life bounded by a limit extending little beyond 18 years. We have seen that, if the children of the poor could have been reared under the same advantages as the children of the rich (and few of those advantages are necessarily beyond their reach), more than 3000 infant deaths would, within the last six years, have been prevented. But, it may be asked, what would become of the community if infant life among

II.—PROXIMATE ESTIMATE of Pecuniary and other SAVING from Sanatory Improvements in Preston.

1	2	3	4	5	6	7	8
Saving by one-third of the actual number of Deaths. The expense of each being estimated at 2*l*. 10*s*.	Saving in the excess of Births beyond 1 in 44 of the Population; the expense of each Birth being taken at 1*l*.	Saving in day's labour from sickness, estimating one-third of the cases out of the expense. 16,710 Cases.	Reduction by one-half of the existing expense of Widowhood and Orphanage, the amount taken from the actual expenditure.	Saving in the expense of Insurance, by keeping the water on night and day, so as to be in readiness at one minute's notice. Estimated on half the number of Houses at 6*s*. per House.	Saving of Productive Manure estimated at 10*s*. per head on the whole Population. All liquid and solid Manure and Street Sweepings being carried out of Town by the Sewers.	Saving in Washing, &c., consequent on the burning of Factory Smoke. Estimated at 1*d*. per head per week of the Population.	Saving of outside painting of Shops and Houses; estimating the cost per House at 25*s*., and the saving at one-fourth of the sum.
£.	£.	£.	£.	£.	£.	£.	£.
1,240	827	7,047	501	15,000	25,000	10,450	1,250

	£.	*s*.	*d*.
Total annual saving to the town.	47,815	0	0
Total weekly saving to the town.	919	10	4
Total annual saving to each house	4	15	7
Total weekly saving to each house	0	1	10
Total annual saving to each individual.	0	19	1
Total weekly saving to each individual	0	0	4¼

the poor were as well preserved as it is among the rich? Would not over-population produce more deplorable consequences than any which are now sustained? The answer is, that when infant life among the poor is better preserved, that most desirable result will be attained chiefly by the prudence and intelligence of the parents; and if those qualities could only be roused into activity and vigour throughout the whole class to which those parents belong, while they will operate in one direction by promoting health and comfort in the cottages of the poor, they will be exercised in another by checking those early and improvident marriages which at present appear chiefly, if not only, to result in the production of an unripe harvest for the scythe of death. If educated persons were to contract marriages with the same reckless disregard to consequences as the labouring class, such imprudence in their case would be visited as severely and as inevitably as it is in the other; but forethought and caution are effectual restraints on the former, while marriages take place among the latter, not merely when there is no reasonable prospect as to future maintenance,—not merely at too early an age,—but when neither the young husband nor wife is in the slightest degree prepared to fulfil the duties incumbent upon them. Perhaps neither can read; the wife cannot prepare a meal either comfortably or frugally; she is unable to dispose of her husband's wages in the manner best adapted for the support and convenience of their home;

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she can neither repair his clothing nor her own; and thus good wages are often squandered by ignorance and incapacity, which, under proper management, would procure every requisite and some luxuries, and permit a little to be placed in the savings' bank. With such unfitness for the character of a wife, in what light does she appear as a mother? Probably she is compelled, by the necessity for her attendance at the factory, to forego one of the greatest of a mother's delights—the nursing of her child. The infant, when a few weeks old, is committed to the care of a nurse, who exposes it to cold, feeds it improperly, and drugs it with "Godfrey," until the little sufferer is soon removed from the world to make room for a successor doomed to the same short but miserable course. Marriages among the poor are prompted not only by thoughtlessness and mere animal instinct, but sometimes, on the part of the man, by heartless selfishness. The writer has met with several cases in which the husband was living in wilful idleness, supported entirely by his poor wife's wages, earned as a warper or power-loom weaver.

Is it true that the characteristics of barbarism are most manifest among people whose women toil while the men are idle?

It is not by any means assumed that were the working population temperate, provident, and intelligent, to the fullest degree which their condition would admit and their sincerest friends desire, their chances of life would be equal to those enjoyed by their wealthier neighbours. Poverty and its attendant train of evils would occasionally press even upon the most deserving, and diminish their powers of resistance to disease; but it *is* assumed that, in Preston, forethought and regular conduct, and the sound information which is within reach of the artisan and labourer, joined at the same time to ventilation, cleanliness, and good drainage of dwellings and streets, would greatly extend their term of existence, and certainly render it much happier. To promote this moral and physical improvement will be a task dependent, not on any one class, but upon the energies and good-will of all classes. If, indeed, one order of society is required to exert itself for the common good more than another, it is that to which Providence has given the most abundant means of attaining and of communicating benefits. Statutes may be passed, and officers appointed to enforce observances necessary to the general health, but unless the whole community cordially and actively unite to second the wise measures of the Legislature, failure to some extent will ensue. It should be impressed upon every one desirous of the melioration of his kind, that filthiness of person and sordidness of mind are usually united; and if you would banish squalour and sickness from the labourer's cottage, you must remove ignorance and corruption from his head and heart. Amidst the dirt and disease of filthy back courts and alleys, and yards, vices and crimes are lurking altogether unimagined by those who have never visited such abodes. It should be remembered, too, that these reservoirs of contagion, under certain conditions of the atmosphere, or some other not improbable

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contingency, may suddenly overflow their usual boundaries, and devastate neighbourhoods, the inhabitants of which are now unconscious of their proximity to such danger; and let it not be imagined that the attempt to improve the sanatory condition of the poor is hopeless—that the endeavours of the well-intentioned and well-educated would not be responded to. There are, even in the most wretched streets, evidences of a leaning to better things—momentary glimpses to relieve the eye and heart aching with the loathsome monotony of personal and mental degradation. Something may be hoped for in people who can feel "a joy in flowers," and cultivate roses and geraniums in the polluted atmosphere of Holden's-square and Willow-street. Queen-street Court, a district especially obnoxious to all the evils which depress the health and morals of the poor, from which noisome smells and consequent sickness are never absent, has some families who keep their houses clean, who appear to attend a place of worship, and who, in every instance but one, are provided with religious books. Springfield-place and River-street also contain persons struggling for cleanliness, and health, and respectability.

These symptoms are healthy and encouraging; they manifest a readiness—nay, an anxiety—for emancipation from the barbarism (alas! that the use of such a word here should be justifiable) in which thousands in this town, as in others, are shrouded. We endeavour to civilize distant people by winning their confidence, by striving to develope the better qualities of their nature, by promoting intercourse with them, and making them alive to its benefits: the same measures are needed at home, where the moral and intellectual extremes of society are as far asunder as if separated by untrodden deserts or untried seas. This mental remoteness and local propinquity cannot long co-exist without change; a great community is never stationary; there is always a tendency upwards or downwards, according as the few above or the many below exercise influence; while, independent of the movement of the general body, there are ever some individuals sinking, and, happily, more successfully struggling to rise. But the great mass is yet chaotic; and unless, by God's blessing, breathed upon by the spirit of intelligence, and of order, and of religion, it may be hurled upon all that is fair and good among us, with a momentum as sudden as irresistible.

Comparison of the Mortality in Preston and three adjoining Rural Districts.

1. *Walton-le-Dale* comprises the townships of Walton, Samlesbury, and Cuerdale; its area is about 5 miles by 4, and the centre of the district is about 2¾ miles from Preston. The population consists of agricultural and general labourers, weavers, and factory hands; the last being, probably, in the greatest proportion.

2. *Alston,* comprising the townships of Dutton, Ribchester, Dilworth, Alston, Hothersall, Grimsargh, Elston, and Ribbleton, lies on the right bank of the Ribble, in a direction north-east of

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Table showing the comparative Age at Death, &c., and the proportion of Births to Population in Preston and the neighbouring Districts of Walton-le-dale, Ashton, and Broughton.

Classes.	Average Age of								Per Centage of each Class Dying												Total Number of Deaths on which the Calculations are made.				Population, 1841				Deaths.				Births.			
	Total Deaths.				Deaths after 21.				Above 21.				Above 5.				Under 5.																			
	Preston.	Walton.	Alston.	Broughton.	Preston.	Walton.	Alston.	Broughton.	Preston.	Walton.	Alston.	Broughton.	Preston.	Walton.	Alston.	Broughton.	Preston.	Walton.	Alston.	Broughton.	Preston.	Walton.	Alston.	Broughton.	Preston.	Walton.	Alston.	Broughton.	Preston.	Walton.	Alston.	Broughton.	Preston.	Walton.	Alston.	Broughton.
Gentry, &c.	47·4	47·6	36·8	37·9	61·2	63·1	54·5	65.7	76·3	73·3	66·7	52·1	82·4	86·7	66·7	82·6	17·6	13·3	33·3	17·4	148	15	6	23	50,131	8,493	4,626	6,638	2·98 per cent., or 1 in 33 annually.	2·1 ,, or 1 in 47 ,,	1·98 ,, or 1 in 50 ,,	1·8 ,, or 1 in 56 ,,	3·5 ,, or 1 in 28 ,,	3·5 ,, or 1 in 29 ,,	3·2 ,, or 1 in 31 ,,	2·9 ,, or 1 in 34 ,,
Tradesmen and Farmers.	31·6	38·8	42·7	43·	54·7	58·5	54·8	62·5	51·8	63·5	74·5	66·5	61·8	77·8	86·3	77·2	38·2	22·2	13·7	22·8	764	126	102	158												
General Labourers	..	26·8	32·5	29·4	..	58·	63·5	52·6	..	42·7	48·9	50·5	..	57·3	60·1	67·6	..	42·7	30·9	32·4	..	407	256	293												
	18·3	..	..	..	50·3	..	..	..	31·6	..	..	..	44·6	..	..	..	55·4	..	..	..	8017	..	..	..												
Weavers and Factory Hands	..	21·4	..	..	..	49·5	..	..	..	36·7	..	..	..	54·8	..	..	..	45·2	..	..	..	526	..	..												
	19·6	25·7	34·8	34·4	51·3	54·5	60·	57·1	34·1	42·5	54·7	55·9	46·7	67·2	65·9	71·5	53·3	41·2	34·	28·5	8929	1074	464	474												

Note.—The above Calculations are made, as regards
Preston and Walton, on an average of 6 years.
Alston ,, ,, 5 years.

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Rev. J

BIRDS EYE VIEW OF GROUF

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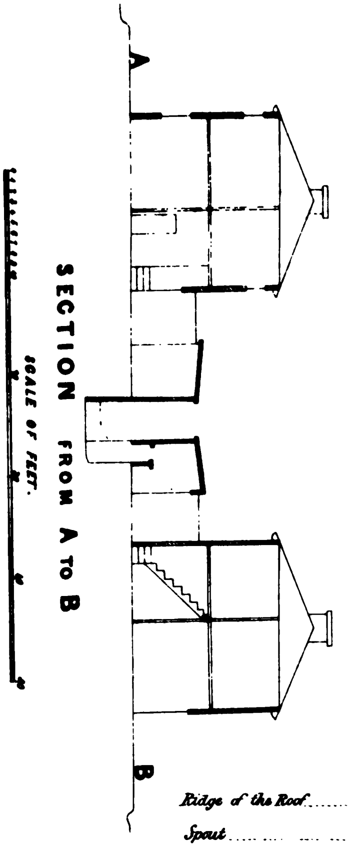

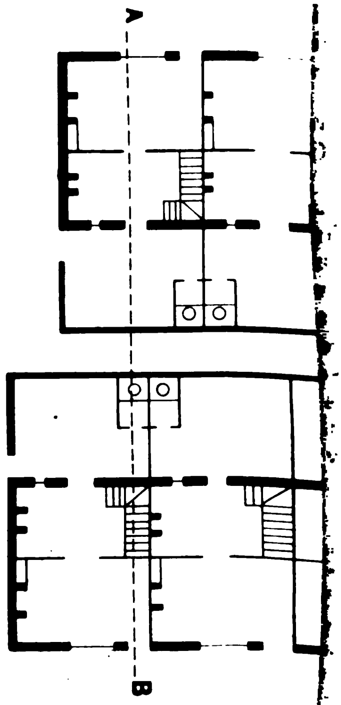

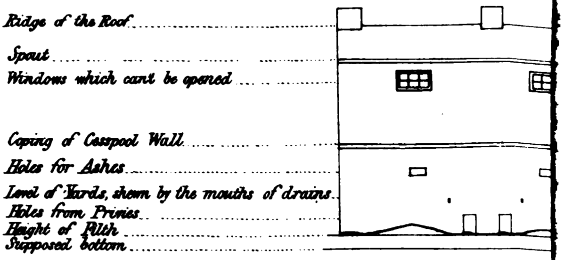

DESCRIPTION. Between the Back Yards of the two rows of Cottages, a Cesspool e
floating in the liquid filth. The Yards are surrounded by Walls 6 ½ feet hig
from the Cesspool, & the foul air so rising into them has no means of escape, e
of a Pigsty and its dung heap. A door to each Privy would be an advantage, but th
belong to the Landlord, and are taken out twice in a year. The heap of one empty
ing Land this Street will probably be extended to nearly double its present
two about 60 Yards each.

PLAN OF COTTAG

Preston.

Rev. J. Clay.

Preston. It is 9 miles long by about 2¾ broad, elevated between 100 and 200 feet above the level of Preston; and the centre of the district is about 6 miles from Preston. The population is principally agricultural, but includes a considerable number of the poorest class of hand-loom weavers.

3. *Broughton* comprises the townships of Broughton, Barton, Fulwood, Lea, Ashton, Haighton, Woodplumpton, Wittingham, and Goosnargh. It lies north of Preston, has an area 5½ by 6½ miles; and the centre of the district is about 3½ miles from that town. The population is entirely agricultural.

These preliminary observations will be sufficiently introductory to the following table which tends to illustrate the general salubrity of the neighbourhood of Preston, and furnishes another instance of the fallacy of estimating the value of life solely by reference to the proportion of deaths to the population rather than by ascertaining the average age at death of those who are removed. Thus while the deaths in Alston are 1 in 50 of the population, and those in Broughton 1 in 56, the average age at death (especially after the attainment of 21), is higher in the former district than in the latter.

[See the Table in page 200.]

[The annexed sketch represents some groups of cottages which are built upon a system so extraordinary as to deserve particular mention. They are introduced as examples of the evils. The plan shows 22 cottages (exclusive of those which block up one end), with their respective back yards opposite to each other. Each back yard is furnished with a privy by the landlord, and, in many cases, with a pigsty and its attendant midden by the tenant. The yard—privy, pigsty, and midden included—is 13 feet 7 inches long by 11 feet 3 inches wide. The wall which separates one yard from another is 6 feet 9 inches high. The range of yards (or *wells*, as they have been aptly named by Mr. Cartwright, who has drawn the plans from a personal survey) is separated from a corresponding range by a fosse, or, as the inhabitants of the houses call it, a "*midden-pan*." This midden-pan is 3 feet 10 inches wide, and in depth about 4 feet below the level of the street; it extends the whole length of the double row of houses, and into it the contents of each privy drain through a hole made for the purpose. The matter thus collected is removed twice a-year from the pan, though not always at the same time from the neighbourhood. When the place was visited, three large heaps of the manure were lying within a few yards of the houses, awaiting purchasers. One of these pans drains into a large pit, which appears stagnant, and which must often be injurious, owing to the source from which it receives a large portion of its contents. It is right to state that the inhabitants of the cottages do not complain of annoyance from these reservoirs of filth; and, with the exception of one row of houses, the mortality does not appear to have been excessive. One woman expressed her great satisfaction at having removed from Albert-street to her present abode; it was "so pleasant to hear the birds singing in a morning, and to see the flowers growing in the spring." It is, probably, owing to the freshness of the surrounding atmosphere, which dilutes the miasmata from the "pans," that the sickness of the district has not been greater; but if, as is probable under the influence of the renewed activity in trade, the buildings should be extended, the circulation and supply of good air will be proportionally impeded, and the present surface of refuse and decomposing matter—exceeding, as it does, 3000 square feet—will produce an amount of disease and death equalling, if not exceeding, that of Queen-street, adverted to in a subsequent page. In another part of the town the "pan" of a block of cottages, built in a manner similar to those just mentioned, was found so offensive that it became necessary to arch it over, and to place a chimney at one end to carry off the bad air.]

Chorlton-upon-Medlock. Report on its Sanatory Condition, by H. P. Holland, Esq.*

Chorlton-upon-Medlock.

P. H. Holland, Esq.

In order to answer the question "What is the general condition of the district with respect to health?" upon sure grounds, I have undertaken a very laborious examination of the condition of every street and court of the district; and next, have ascertained the rate of mortality in each during the five years ending June, 1843. I first obtained from the books of the assessors of the poors' rate the number of occupied and unoccupied houses in each street, and their rent; I next visited each street, and took notes *on the spot* of its condition as to paving, cleansing, sewering, and free circulation of air or otherwise; of the general condition of the dwellings with respect to cleanliness, dampness, or dryness, and supply of water; whether or not they had back-doors, yards, privies, &c.; and remarked upon any other circumstances which caught my attention as likely to influence the health of the inhabitants. These observations I compared with information kindly furnished by Mr. Langtry, the district surveyor, and other public officers, as well as from the inhabitants themselves, and from the result classified the streets into nine subdivisions; first, into three divisions as respects the streets themselves, the best, intermediate, and worst-conditioned classes; next, each of these into three subdivisions, according as the houses were of the first, second, or worst rates.

In this classification almost all of those streets are excluded which are situated south of Corn Brook, partly because that part of the township can scarcely be considered a town district, partly because of the difficulty of determining with a close degree of accuracy the amount of their population during the whole of the period in question.

The first class of streets includes those of the town part of Chorlton-upon-Medlock, which are completely paved and sewered, regularly cleaned, are thoroughfares, and wide enough to admit of a free circulation of air, such as Oxford-street, Grosvenor-street, Greek-street, York-street, &c.

The second or intermediate class are such as are unpaved and imperfectly drained, but still kept clean and tolerably dry, as well as such as, though paved, are too narrow and confined to admit of a free circulation of air, of which class Angel-street, Prospect-street, Burton-street, Newton-street, Cross-street, Lord-street, Stafford-street, &c., are examples.

The third class are those which are not paved, not sewered, not cleaned, and not well ventilated; are often little better than courts, such as Mark-lane, Garden-street, Medlock-street, Allen-street, Billington-street; Heyes-street, Bury-street, Back Temple-street, Woburn-place, &c.

The subdivisions are made according to the houses.

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* Extracted from the Report on the State of Large Towns in Lancashire, by Dr. Lyon Playfair.

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The first class of which are those of ample size, provided with yards, lobbies, and kitchens, are well supplied with water, and and which have nothing about them which attracted my notice as likely to be injurious to health. Generally speaking they are those which exceed 20*l.* a-year rent; but the rent alone is a very insufficient guide, as it is much influenced by the situation, and other circumstances.

The second class includes the better sort of cottages, those that have back-doors, and those larger houses which, being close behind, or on damp soil, or badly supplied with water, cannot be considered quite unobjectionable.

The third class includes those streets where the majority of the dwellings are without back doors, without yards and privies, without a proper supply of water, or have some other very evident defect.

I next undertook an analysis of the deaths registered, as occurring in the district during the five years ending June, 30, 1843, and ascertained how many deaths had occurred in each of the streets during that period. The number of inhabitants and the number of houses in 1841 was ascertained by the Census, and the proportion of inhabitants to houses in each part of the district at that time is known and is given in the enumerators' schedules. Assuming that that proportion remains the same, I have calculated the number of inhabitants of each street from the number of houses in occupation, as given by the assessors' rate-books, and though these numbers are not quite correct, the errors must be so small as to be unimportant. Thus the average rate of mortality in each street may be ascertained within a small error.

In order to avoid the possibility of unconsciously warping the result, I completed the classification of the streets *before* I knew what was their rate of mortality; the two inquiries were completed separately, and the results compared afterwards. Many of the streets have been paved and sewered during the five years: these have been placed in two classes; in the class in which they were before their improvement during the time they remained unimproved, and in the class to which they now belong during the years subsequent to their improvement. In some cases a small street has been taken as part of the next large street, when the two are in the same rānk as to condition; such arrangement causes no error in the estimated amount of mortality, and was convenient.

This analysis shows a very striking difference in the average rate of mortality among the inhabitants of the different streets; for instance, it has been 1·9 per cent. per annum among the inhabitants of the first-class streets and the first-class houses, and 4 per cent. in the third or worst-class streets and third-class houses. It would be a great mistake, however, to suppose that this great difference is owing only, or even principally, to the bad condition of the streets and houses where the mortality has been greatest, powerful as that evil influence undoubtedly is. These worst streets are, of

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course, inhabited exclusively by the poor; those who can afford to pay for better accommodation will not live in these miserable dwellings. The inhabitants of these worst streets are therefore not only worst lodged, but also the worst fed, the worst clothed, the most over-worked part of the population. Many of them are also the most improvident and dissipated, and are poor because they are so; whilst almost all of them have been, during the period in question, among the most severe sufferers from the pressure of bad trade and dear food, evil influences which are so constantly connected together. The influence of all these circumstances must be allowed for before assuming that the high rate of mortality is attributable to the bad condition of the houses and the streets. Another circumstance also must be taken into consideration. A poor district has almost always a larger proportion of children than a wealthier one, and the rate of mortality among children is higher than among adults. A great part of this high infantile mortality among the poor is indeed owing to removable causes of disease, but still some allowance must be made for the naturally higher rate of mortality among a population which has a large proportion of children.

The rate of mortality among the inhabitants of the first-class houses does not appear to be powerfully influenced by the character of the streets in which they are situated, though it is somewhat. None of the streets containing the best class of houses are in a very bad condition; persons who can afford to live in large houses can afford to have their streets kept in proper order. But still some difference exists, some of the streets are not so wide and open as the others; for instance, Sidney-street, Russell-street, and Rutland-street, as compared with Oxford-street, Brook-street or Ardwick-green, and the rate of mortality has been pretty constantly higher in those streets, which are least airy.

The effect of the condition of the streets appears greater among the inhabitants of the second class of houses; for of these, among those in the first class of streets the rate of mortality has been 2·2 per cent., in the second class 2·6, and in the third class 2·8 per cent. per annum.

In the third-class houses the rate of mortality has been 2·7 per cent. in the first, and 2·8 per cent. in the second class of streets, and 4 per cent. in the worst class of streets and houses. Part of this excess must (as has been before remarked) be attributed to other causes than the bad condition of the streets; and it is difficult to determine how much ought to be attributed to this latter, the most easily removable of the causes of disease. With the view of in some degree answering such inquiry, I have ascertained what has been the mortality in 20 streets which were a few years ago in a very bad condition, and which have since been improved, and I find that in some few the rate has been higher after the improvement than before, but in most of them it has been lower. The streets in question are inhabited by about 3500 persons, among

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whom the rate of mortality was about 3·1 per cent., or 1 in 32 before the streets were paved, and 2·53, or 1 in 39 since the improvement. There seems to be no reason for supposing that the rank of the inhabitants has altered, or their number diminished. It would appear, then, that the deaths are diminished more than 20 a-year out of 110, by putting the streets into proper condition. Nor shall we be surprised at the beneficial effects of such a change, when we recollect that when a street is properly paved and drained, and regularly cleaned, it becomes comparatively easy to keep the houses clean, which before was almost impossible; thence follow habits of personal cleanliness, which before could not be fostered. There is good reason to hope, therefore, that as those habits become strengthened, the beneficial influence will become still more apparent. The facilities afforded to cleanliness are also favourable to economy; clothes and furniture last longer, provisions will keep better, hence there is less waste; and in various ways the scanty income of the poor is made to go further. The different moral effects of living in the midst of dirt or in cleanliness, are too evident to require mentioning.

The following table (No. 1) exhibits the proportion per cent. of each class of streets and of houses, in which the rate of mortality has been during the last five years below 2 per cent. per annum, between 2 and 3 per cent. and above 3 per cent.

TABLE 1.

Class of Streets.	Class of Houses.	Proportions per Cent. of Streets in which the Mortality has been			Examples of Classes of Streets and Houses.
		Below 2 per Cent.	Between 2 and 3 per Cent.	Above 3 per Cent.	
1st .	1st .	50	50	..	Oxford-st., Grosvenor-st., Sidney-st., Rutland-st.
	2nd .	20	65	15	Greek-st., Clarendon-st., Chatham-st.
	3rd .	..	33	67	Charles-st., York-st., Chester-st.
2nd .	1st .	54	39	7	Angle-st., Carver-st., Prospect-st.
	2nd .	30	30	40	Ann-st., Burton-st., Caygill-st.
	3rd .	14	43	43	Cross-st., Evans-st., Rathbone-st.
3rd .	1st .	..	..	..	None of the third class of streets have first-class houses.
	2nd .	..	50	50	Bell-st., Mark-lane, Charlotte-st.
	3rd .	..	20	80	Medlock-st., Makin-st., Bury-st., Burns-st.

Inspection of the above table will show how constantly a low rate of mortality has accompanied a good condition of streets and dwellings, and a high rate of mortality the contrary condition. Among the inhabitants of the first class of houses and streets, it will be seen that in none has the rate of mortality exceeded 3 per cent.; and of the second-class houses and first-class streets, in 1 in 15 only has it risen above that amount. But of the third-class houses in 67 per cent, of the first, 43 per cent. of the second, and

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80 per cent. of the third-class streets, has the rate of mortality exceeded 3 per cent.; in some particular streets it has been twice that amount. Among the worst are Bury-street, Burns-street, Heyes-street, Dorning-street, Medlock-street, Tebbutts-court, Wilson-street, Woburn-place, Back Temple-street, Back Kay-street, Allen-street, and Bond-street. All of these streets have some evident defect; the seven first-mentioned are not thoroughfares, and are built up, or nearly so, at one end; all of them are unpaved and undrained; the houses are built back to back, and have no back-doors. They are all of them little better than courts.

It will further be observed, that in none of the worst-conditioned streets has the rate of mortality been lower than 2 per cent., while of those of the best condition a considerable proportion have had a lower rate of mortality: and further, of the worst-conditioned streets in half of those with second-class houses, the mortality has been less than 3 per cent., while of those with third-class houses four-fifths have had a mortality exceeding that amount.

These facts present a striking illustration of the ill effects of badly-conditioned dwellings and streets, but still more strikingly exhibit the destructive influences of poverty, as shown by the high rate of mortality among the inhabitants of low-rented houses.

The following table (No. 2) exhibits the rate of annual mortality in the different classes of streets of the town part of Chorlton-upon-Medlock, in the average of the five years ending June, 1843. The amount of the population of this part of the township is computed at 24,682; among whom there have been 3235 deaths, or 647 a-year, being an average annual mortality of about 2·6 per cent., or 1 in 38. The rate of mortality in the different classes of streets will be seen to differ very widely.

TABLE 2.

Class of Streets.	Class of Houses.	Computed Population.	Rate of Mortality. (For examples see Table 1).
			Per Cent.
1st . . .	1st. . .	5153	1·95 or 1 in 51
	2nd . .	4350	2·2 1 45
	3rd . .	980	2·7 1 36
2nd . .	1st . .	1431	1·8 1 55
	2nd . .	5094	2·6 1 38
	3rd . .	2780	2·8 1 35
3rd . .	1st . .	..	.. ..
	2nd . .	820	2·8 1 35
	3rd . .	4074	4· 1 25

TABLE 3.

Exhibiting the Rate of Mortality in different Classes of Streets, the Houses being of all Rates.

	Rate of Mortality.	Excess per Cent. above First-Class Streets.
Streets of 1st Class .	2·2 per Cent., or 1 in 46	..
2nd Class .	2·6 ,, 1 in 39	18
3rd Class .	3·7 ,, 1 in 27	68

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TABLE 4.

Exhibiting the Rate of Mortality among the inhabitants of different Classes of Houses, the Streets being of all Classes.

	Rate of Mortality.		Excess per Cent. above First-Class Streets.
Houses of 1st Class .	1·9 per Cent., or	1 in 52	About
2nd Class .	2·5 ,,	1 in 40	31
3rd Class .	3·4 ,,	1 in 29	78

From comparison of these tables it would appear that the rate of mortality is more influenced by the class of house inhabited than by the condition of the street; for we find that the mortality in the first, second, and third classes of streets, the houses being of all classes, has been in the proportion of 100, 118, and 168; but in the houses of the first, second, and third classes, the streets being of all classes, that the proportion of mortality has been 100, 131, and 178; there is therefore a greater difference in the rate of mortality among inhabitants of different classes of houses than in those of streets of different condition. When, however, the evil influences of both badly-constructed dwellings and of badly-conditioned streets operate together, the destructive effect is very striking. For instance, the third-class houses of the first, second, and third-class streets are nearly alike in construction, are about the same size, are charged about the same rent, and are inhabited by about the same class of persons; but the rate of mortality in the third-class houses in first and second-class streets has been 2·7 and 2·8 per cent. respectively, while in those of the same class of houses, but in third-class streets, the rate has been 4 per cent., or a higher rate of mortality, in the proportion of 10 to 7. I am aware of no circumstances but those connected with the bad condition of the streets which will account for this great difference.

It may be thought that these streets are inhabited by a poorer class than the others, but I do not believe that that is the fact, except so far as their poverty is increased by the expenses of sickness and death in their families, and by consequent loss of work. Their incomes *while at work* must be much the same, for they have the same sort of employments. There seems every reason to hope that if these worst streets were put into good condition, the rate of mortality would fall 25 per cent., or more. The diminution in the rate of mortality has been nearly 20 per cent. in the streets which have been improved, as before stated, it has fallen from 3·1 per cent., or 1 in 32, to 2·53 per cent., or 1 in 39; the effect of a permanent good condition, as we have just seen, appears to be still more beneficial; and there can be no doubt that if the houses, as well as the streets, were put into proper condition, the rate of mortality would fall still more. It is, indeed, unreasonable to expect that the general state of health and longevity of the poor can be raised, as high as that of those in more comfortable circumstances by any, the best, sanatory arrangements, but I think the evidence here adduced distinctly shows that the rate of mortality, among the poor

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certainly, among all classes probably, is unnaturally high, from the operation of removable causes of disease.

When we find the rate of mortality four times as high in some streets as in others, and twice as high in whole classes of streets as in other classes, and further find that it is all but *invariably* high in those streets which are in bad condition, and almost as invariably low in those whose condition is good, we cannot resist the conclusion that multitudes of our fellow-creatures, *hundreds of our immediate neighbours,* are annually destroyed for want of the most evident precautions.

The great faults in those parts of the district where disease is most prevalent are, as regards the streets, want of drainage, paving, and regular scavenging, obstructions to the free circulation of air, and a sufficient supply and proper regulation of the privies. Three of the worst streets in the township are Bury-street, Binn-street, and Heyes-street. These are three little streets, or rather alleys, on the north of Jackson-street, each about 50 yards long, and five or six wide: there are in all 62 houses, of which five were unoccupied. There have been during the last five years 77 deaths in those three streets, being a rate of mortality of about 5·4 per cent., supposing the population to have averaged about five in each house. The ground on which these 62 houses stand is, including the streets, about 1250 square yards, being less than five square yards for each individual. The ill effect of this very confined space is increased by the narrow streets being closed at one end; and to make the matter worse, at these closed ends there are privies, generally over-full and in bad order, which, joined with the filth in the streets, cause an almost constantly bad smell. The streets are wretchedly paved, and apparently not drained at all. The water from the pumps is foul, probably from filth filtering through the soil into the wells. The houses are close and dirty, have no back-doors, or free passage for air. The inhabitants are poor and wretched; and it is no matter of surprise that the mortality among them is above twice the average amount.

There are, perhaps, a dozen streets and many courts to which such a description would nearly apply, and in all such the rate of mortality is high. The reason why the miserable habitations of such streets find tenants is of course the lowness of the rents; it may, however, well be doubted if such saving be not far overbalanced by the mere *money* loss, fairly calculated, resulting from their insalubrity, to say nothing of the bodily and mental suffering unnecessarily endured. For instance, the rent of the houses in the streets above mentioned, where the average rate of mortality has been 5·4 per cent., or 1 in 18, varies from 1*s.* 9*d.* to 3*s.* a-week, the average is about 2*s.* 3*d.* The rent of the second-class houses in the second-class street, is about 3*s.* 6*d.* or 4*s.*, or about 4*l.* a-year more; but the average rate of mortality in this class of dwellings has been two and a half per cent., or 1 in 40, not half as much as in those houses erroneously considered *cheaper*. The rate of mortality is a pretty

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fair indication of the amount of sickness; and we may, perhaps, assume that the amount of sickness, or of sickliness, as well as of mortality, has been about twice as great. Supposing that (according to the approximation given below) the average amount of sickness among a population where the rate of mortality is three per cent. is about 12 days a-year, it will be about 20 days where the mortality is five per cent., and about 10 days where it is two and a half per cent. In a family of five individuals, therefore, there will be on the average about 50 days a-year more sickness *due to the insalubrity of the dwellings.* There can, I think, be little doubt that the expenses, loss of work, time occupied in nursing, for 50 extra days of sickness in the family, added to occasional extra funeral expenses, &c., consequent upon the insalubrity, will be a greater pecuniary loss than 4*l.* a-year, the difference of rent between good and bad habitations for the poor. As has been repeatedly remarked, a great part of the high rate of mortality among the poor is a *direct* consequence of poverty; but it must not be forgotten that the frequent sickness, and a generally low state of health, and therefore diminished mental as well as physical energy, is one great cause of the poverty. Let us remedy that cause of general ill-health (insalubrity of the habitations of the poor) which is quite within our reach, and we shall certainly diminish that other cause, poverty, which appears to be only partially under our controul.

I know of no satisfactory means of ascertaining with any considerable approach to accuracy the average duration of illness. I know of no returns including the whole population, female as well as male, and infantile as well as adult. The sick-clubs do not include a fair average of all ages, nor do they include the most sickly part of the population, and the rate of sickness deduced from their returns is too low. The dispensary cases are drawn from an uncertain amount of population; while answers to individual inquiries are not much to be depended upon. An approximate estimate may, perhaps, be drawn from the rate of mortality. Out of 324,041 cases (excluding slight accidents, &c.) admitted at four medical charities in 12 years, there were 11,587 deaths, that is, about 28 cases to one death. Supposing this to be about the proportion of sickness to mortality, and that each case of sickness lasts about two weeks (a very low estimate), there would be 12 days of sickness per annum among such a population of *all* ages as that of the working classes of this township, among whom the mortality is about three per cent. per annum, or 1 in 33 (14 days × 28 × ·03=11·76 days).* The amount of both sickness and of mortality is much affected by the state of trade, and by the dearness or

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* Mr. Farr, from widely different data, has estimated the number constantly sick to be on the average about three per cent.; this gives 11 days' sickness (365 days × ·03 = 10·95) for each individual on the average.—*British Medical Almanac,* 1837, p. 136.

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cheapness of provision, as has been shown by Milne, Villermé, and other eminent authorities. Of this fact the number of cases and of deaths at the four dispensaries of Manchester, in a series of 12 years, is an illustration; for during the six years of cheaper food, there were admitted 154,692 patients, of whom 5205 died, while in the six years of higher prices 169,349 patients were admitted, of whom 6382 died, being an excess in the dearer years of 10 per cent. of cases, and 22 per cent. of deaths. No reasonable person would think of drawing a general inference from a *single* observation of this sort, but there is, perhaps, no statistical fact better established than that diminished comfort causes diminished health,—increases disease and death.

Replies to Supplementary Questions.

Do the poor frequently delay the burial of their deceased friends, and do any evils result from this?

Among the labouring classes funerals are very generally delayed until the Sunday next after the decease, when the friends will be able to attend the funeral without the loss of their wages, a loss which they can ill afford; besides, they are often obliged to wait till Saturday for their wages to pay the expenses. When the body can be kept in the house without its being necessary for any of the family to sleep in the same room in which it is, no great mischief results; but among the poor this is not often the case. In the summer it frequently happens that when the bodies are brought for interment they are quite offensive, and it cannot but happen that mischief must be caused to those who are compelled to live in the same room with a decomposing corpse. In some few cases I have, I think, traced the spread of infectious disease to this practice of keeping the dead unburied. In one instance, six cases of small-pox, several of them fatal, were apparently thus produced. The mother of three of the sufferers told me that her children had caught the small-pox in consequence of her mangle-woman allowing the body of her child, which had died of small-pox, to remain several days unburied; and I think she was correct in this supposition, for it appears that the mangle-woman allowed the clothes of these children to lie on the bed on which the deceased child was laid out. Within a week these three children were attacked, two of whom subsequently died. The other cases occurred in the same street, and apparently arose from the same source of infection. How far the disease spread I cannot learn. It is almost certain that if the body of the child who first died had been quickly removed, and ordinary precautions taken, that several of the victims of this most dreadful disease would have been spared.

I think it would be impossible to force the poor to bury their dead much sooner than they do, and certainly very undesirable to try, except by persuasion. But if a dead-house were provided, in

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which the dead might be deposited until the friends could attend the funeral, I think, from some few inquiries which I have made, that the plan would find favour, and gradually, though slowly, the injurious practice of keeping their dead for several days in their houses would decline. No force need be, or ought to be, used in this matter, except in extreme cases where public safety demands it. If the poor were firmly assured that their deceased friends would be safely kept, and that not even *post-mortem* examination would be allowed without their consent, and if at their own time they would be allowed to manage the funeral in their own way, as at present, their objections to removing their dead from their own immediate superintendence would quickly die away, and the comfort and safety thus procured for them would be felt as a valuable boon.

By the adoption of such a plan we should secure most of the advantages of quick interment, without the danger of burying those who may be only apparently dead. It would be quite easy and safe to keep the dead in a well-ventilated dead-house, until the commencement of decomposition assures us that the death is real. The use of chlorine would render infection impossible, and would decompose any sulphuretted hydrogen and putrid gases that might be evolved. And prompt assistance might be provided for the chance of reviving any brought there, who may be only apparently dead.

Are there any serious and removable evils attending the present arrangements of necessaries?

Yes, many very serious, and very easily remedied. Frequently the seat and floor of the public necessaries are allowed to be dirty. I am told it would be easy to have them regularly cleaned by contract (the contractor to be liable to penalty for neglect), in return for the value of the manure. Often they are not in proper repair, and the contents are allowed to overflow. The owner of the property is, by the Police Act, compellable to repair them, and it would be easy to enforce this provision. Sometimes the midden of a necessary is separated from a house only by a wall, which is not always impervious to liquid. I have known instances where the wall of a dwelling-house has been constantly wet with fœtid fluid, which has filtered through from a midden, and poisoned the air with its intolerable stench; and the family was never free from sickness during the six months they endured the nuisance. Instances in which fœtid air finds its way into the next dwelling-house are not unfrequent. I know an instance (and I believe there are many such) where it is impossible to keep food without its being tainted for even a single night in the cupboards on the side of the house next the public necessary, and where the fœtor is offensively perceptible always, and oppressive in the morning before the door is opened. In this instance the woman of the house told me she had never been well since she came to it, and the only reason I could get for her living in it was, the house was 6*d.* a-week cheaper than

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others free from the nuisance. It is evident that these evils would be very considerably diminished by lining the walls of all the necessaries which are not separated from houses with flags and cement, so as to make them impervious either to air or liquid, while a flue should be erected to convey the fœtid gas above the roofs of the houses, and not leave it to be diffused among the air which the inhabitants must breathe. But to remedy the evil effectually, water-closets should be substituted for necessaries, and no accumulation of excrement allowed.

Would it be a sufficient remedy to compel the owners to erect a separate privy for each house?

This ought to be done wherever possible, if only for decency's sake. I have no evidence of any actual licentiousness resulting from both sexes and all ages, of perhaps 20 families using the same necessary, but it must undermine modesty at least. I am, however, afraid it is an evil that must be borne with, as some thousands of houses are so built that a necessary could not be attached to each without pulling half of them down. None, however, should be allowed to be so built for the future. But even when each house has a separate necessary, where many are close together the evil may be, and often is, very serious indeed. For instance, I know a back street about 4 feet wide and not 300 long, in which there are 38 necessaries, each with an open midden. The street being too narrow to admit a cart, the manure has to be carried in wheelbarrows, and much of it is spilt during this tedious operation, and the passage is not generally carefully cleaned afterwards. It rarely happens that more than a few days pass without one or other of these 38 middens requiring emptying, when all the inhabitants of both rows of houses are annoyed by the stench from the disturbed filth, and the back street is almost constantly dirty. Each of these middens will contain more than a ton of manure, and are not emptied till they are full; there will be therefore, on the average, in each more than half a ton, or nearly 20 tons of decomposing filth in the very confined space between two rows of houses only about five yards apart, a space, including the yards, of less than 500 square yards. It is evident that the only complete remedy is to prevent the accumulation of manure in such large quantity in the immediate neighbourhood of dwellings, by washing it away into the sewers, that is, by the erection of water-closets in all cases where houses are built closely together. Where great economy is important, a very simple form of water-closet would suffice. A pan with a perpendicular pipe leading into the drain, through which the waste water from the house and roof would flow would be sufficient. The present necessaries might be converted into such water-closets at an expense of 5*l.* or 6*l.* each, and the tenants would very gladly pay a small additional rent to be free from the annoyance and injury the present arrangement produces; while the landlords would find it their interest to incur some expense to avoid the injury which their pro-

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perty now suffers from liquid filtering through to the foundation of the houses.

Are there not general evils from the present mode of getting rid of the manure of a large town like Manchester, and how do you think they can be most easily and economically avoided?

The present mode of getting rid of the enormous quantities of manure and filth of all sorts produced in this great town is both a nuisance and an injury. Much of it has to be carted away. Along one road alone (the Chester road) more than a hundred loads a-day are carted. Mr. Moore ascertained that in the week ending 16th of August, 1843, 647 loads of manure passed through the Cornbrook bar; probably this is much below the average of the year, as the greatest quantity is taken in winter; and the nuisance caused by the constant passage of manure-carts is very great. But a very large proportion of the filth is washed into the streams, which are rendered foul beyond description.

The river Medlock is the receptacle for the drainage of Ardwick, Chorlton-upon-Medlock, Hulme, and a large portion of Manchester, in all having a population of about 100,000. In addition to the filth drained from the streets and houses, it receives the waste from numerous dye-work, print-works, and factories, the whole forming the vilest compound of villainous smells that the most lively imagination can conceive. Part of this fluid filth (it cannot be called water) flows into the Irwell, near Hulme Hall, but part also is retained to feed the Duke of Bridgewater's canal, which for miles gives out its disgusting odours. A constant decomposition of the filth at the bottom of the canal is going on, and large quantities of carburetted hydrogen bubble up, causing an appearance like strong ebullition. The inhabitants of the houses near the canal are much annoyed, and it no doubt causes a very great deterioration in the value of the property in its neighbourhood. The little brook which runs through Greenheys, Cornbrook, produces injury of the same sort on a smaller scale, but as there is more valuable property in its neighbourhood, the actual injury it causes may be even greater, and it is the more annoying as the remedy is so easy, that of sending the filthy water underground.

Entirely to remedy the nuisance produced by the filth sent into the Medlock and the canal, and carted along the streets and roads, is perhaps not possible; but it is quite possible to diminish it to a very great extent, and even to produce revenue by so doing.

A very large sewer or drain carried along the bed of the Medlock, avoiding the large curves, where economical to do so, might be made to receive the drainage of all Ardwick, Chorlton, Hulme, and about one-third of Manchester, all of which now flows into the Medlock. The area of this district is something less than four square miles. The average yearly fall of rain is 35,518 inches, or less than 1-10th of an inch per day, therefore the average quantity falling on four square miles, or about twelve million square yards, is about

33,333 cubic yards each day, which a sewer of three yards area, with fall enough for a run of two miles an hour, would convey away in less than three hours and a half; such a sewer, with such a fall, would therefore be sufficient for the drainage of a district of four square miles, whenever the quantity of rain did not exceed seven times the average amount, exclusive of what sinks into the soil or evaporates. For the purpose of securing the manure a larger one would not be necessary, as in time of flood, except for the first hour or two, little besides water would be brought down, and that might, without injury, be allowed to overflow into its natural channels.

But in order to make the most economical use of the manure, it must be conveyed to the land by irrigation, and in order to effect this I would propose that a large sewer, about 7 feet high by 4 wide, be made, commencing near Ardwick Bridge, running along the course of the Medlock and emptying itself into a large tank, on the south bank of the Duke of Bridgewater's canal. Its length would be about 3000 yards, its cost 10,000*l.* or 12,000*l.*, probably less, for the bed of the river might be taken advantage of and much excavation avoided. In the tank the heavier solid matters would subside, and might be from time to time conveyed away in boats along the canal; but all the soluble and easily suspended portions should be conveyed by a drain and distributed by irrigation upon the land. A covered drain should run along-side the canal to Stretford, and distribute its contents on the rich grass land of the valley of the Mersey. The distribution of the manure need not, however, be delayed until it arrive there, but branch drains might lead it off to the fields to the south of the canal, beginning at Old Trafford and continuing in its whole course. The level of the land here is a little above that of the proposed drain, but the expense of raising the liquid manure, if wind power were employed, would be inconsiderable, certainly much less than the expense of spreading manure by hand. As the quantity of liquid mânure would be thus constantly diminishing, so also might the drain which is to convey it; and probably an average area of six square feet would be large enough. Such a drain, running at an average depth of 4 feet, (the country is nearly level,) would not cost more than 14*s.* a running foot, or about 3700*l.* a mile, and not 16,000*l.* from the tank at Hulme to the bank of the Mersey at Stretford, where the large drain would terminate in the smaller drains required from distribution into the particular fields. For this purpose drains of the size of common street surface sewers, 15 inches by 12, would be sufficient, which cost 2*s.* 3*d.* a lineal foot, or 594*l.* a mile. Suppose 20 miles of such drains, including those branching off from the main drain on its course to be required, the cost would be less than 12,000*l.* In all, the expense of these drains would be from the large drain conveying all the liquid filth to the main tank 12,000*l.*, the large

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drain of four miles' length from the tank to Stretford 16,000*l.*, twenty miles of distributing drains 12,000*l.*,—in all less than 40,000*l.*

To the interest of this large sum must be added the probable annual expense of obtaining a sufficient supply of water to wash down all the filth, and the expense of the tank, and of additional sewering to convey the filth from all the houses. Most of this latter expense would be borne by individuals, but part probably by the public. Let us suppose 2000*l.* a-year to be required for these items.

It is difficult to form a satisfactory estimate of the quantity and value of the manure produced, but an approximation may be arrived at. Mr. Moore ascertained that in one week in August 647 loads of night-soil, averaging nearly two tons each, passed through the Cornbrook Bar; this is at the rate of more than 60,000 tons a-year, and the quantity is much greater in winter than in autumn. Probably not half of the manure produced, particularly of the liquid and most valuable part, is thus carted away.

The expense of loading, carting, and spreading this manure cannot be less than 10*s.* a-ton, and at least 30,000*l.* a-year must be spent in this manner, either by the farmers for manure, or by the occupiers to get rid of it. If we suppose that only half of the manure carted through Cornbrook Bar is brought from the district in question, and that only half of that could be conveyed to the soil by irrigation, the annual saving would be 7500*l.*; and there is no doubt that a much larger portion could be so conveyed. Deducting from this saving 2000*l.* a-year for expenses of water, repairs, management, &c., would leave 5500*l.* as interest upon an outlay of 40,000*l.*, or 13¾ per cent.

That this estimate of the value of the manure is below, rather than above, the truth, will, I think, be allowed when the enormous quantity really produced is considered. Liëbig estimates the weight of excrement as 1½ lb. per day for each individual (¼ lb. fæces, 1¼ lb. urine,—the most valuable portion, most of it now lost). A population of 100,000 would, therefore, produce 150,000 lbs. daily, or 24,440 tons a-year; to this must be added that produced by cattle, horses, and domestic animals, refuse from slaughter-houses, kitchens, and manufactories, in all, perhaps, as much more. Suppose this uncertain quantity to be disregarded, or to be considered as a set-off against that part of the rest which would not find its way into the sewers; according to this estimate we shall have 24,440 tons weight of the richest manure, containing 3 per cent., or 738 tons of nitrogen, sufficient, according to Liëbig, to manure 50,000 acres of land,* and, if conveyed to the soil by irrigation, worth at least 12,000*l.* a-year, and probably much more.

That even such an estimate as this is not altogether extravagant

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* Report on the Sanatory Condition of the Labouring Population, p. 50.

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is evident from the experience of Edinburgh, where the rent of some land irrigated from the drainage of only part of that city has increased in value tenfold, and where the owners estimate the compensation which would induce them to discontinue the practice at 150,000*l*. It would appear that if the whole drainage of the city were rendered available, and the profits secured to the public, there would be an income of from 15,000*l*. to 20,000*l*. a-year for public purposes.* My estimate of an income of 7500*l*. from the manure produced by a population of 100,000 is then very moderate, indeed it might, perhaps, be doubled or trebled; so even supposing the first expenses to be very much under estimated, it appears certain that there would be a very large profit.

It is evident that to effect such an alteration as this the corporation must have increased power from the Legislature. They must have the right to construct the drains in any one's property, paying, of course, for any injury they may occasion; and they must have the right of receiving the extra rent produced by the additional fertility caused by the irrigation, or, perhaps, the right of purchasing any land at its present value, in order that the public may receive the benefit of its increased value. In order that *all* the manure produced should pass into the main drain, and so be most economically employed, it would be necessary that water-closets should be universal; but practically it would, perhaps be sufficient if all householders were compelled to open drains from their midden or cesspools into the public drain. By this plan the most valuable part of the manure would pass; but perhaps owners would be induced pretty generally to erect water-closets if the police regulations with respect to night-soil were stringently enforced, and facilities for the supply of water afforded. At any rate there would be no difficulty in procuring all the soluble or easily suspended manure by conveying the waste water from the house and roof through the midden, and thence by a drain into the public sewer; and though without the use of water-closets we could not avoid entirely the necessity and nuisance of manure-carts, yet the occasions for their employment would thus be very much diminished.

A similar plan might be adopted to dispose of the liquid manure of Manchester and Salford, which might be conveyed along the north bank of the Irwell, and distributed upon the meadow land, beginning with those opposite Throstle Nest.

If such methods of conveying the filth away were adopted, not only would the water in our rivers and the canal be much less impure, but the nuisance caused by daily carting hundreds of tons of manure along the public roads rendered in a great degree unnecessary; while it is almost certain that a very large revenue might be obtained in addition to these evident advantages. Foul-

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* Report on the Sanatory Condition of the Labouring Population, p. 50.

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water irrigation in the immediate neighbourhood of a town ought not to be allowed; but the land which I have spoken of lies a long way off any considerable number of houses, and the nuisance produced by thus manuring it would not be nearly so great to so large a number of persons as that at present endured. Lime, gypsum, and other substances, might be easily added to the liquid manure while passing through the tank, which would both add to its value and diminish the offensive smell. It is not impossible that, without incurring any extravagant expense, the manure might, by artificial means, be rendered quite inodorous.

City of York.
T. Laycock, M.D.

Report on the State of the City of York, in reply to the Questions circulated by the Commissioners for inquiring into the State of Large Towns and Populous Districts. By T. Laycock, M.D., *Physician to the York Dispensary.*

Geographical Position.

York is situate in the centre of an extensive vale of that name, in north latitude 53° 48″, west longitude 4° 19″. It lies between the rivers Ouse and Foss, immediately above their junction. Both are tidal rivers, and navigable. The tide, however, is prevented from rising so far as the city by a lock (Naburn Lock), about five miles distant. The summer level of the Ouse (as measured on July 1st, 1842) is 16 feet above the datum plane of mean tide; that of the Foss is 23 feet above the same plane; a lock just above its junction with the Ouse keeping it at this higher level. The geology of the district is explained in the following letter addressed to me, by the Reverend William Vernon Harcourt, M.A., F.R.S., F.G.S., Canon Residentiary of York Cathedral, &c., &c., and Chairman of the York Sanatory Sub-committee.[*]

Dear Sir,

I shall be happy to contribute such assistance as lies in my power to the labours which you have so laudably undertaken, by stating to you the views I entertain of the waters and drainage of York.

The water available in York for different purposes is supplied from three sources;—first, from the river Ouse; second, from wells which vary in depth from about 12 to 40 feet; third, from borings carried down to a depth of from 350 to 380 feet from the surface.

In the superficial wells, the water is found and stands at different altitudes; in the deep borings the chief supply is found below the depth of 300 feet; the water rises in distant borings to about the same level, and that level I estimate at from 15 to 20 feet above the common level of the river Ouse. The water of some of the shallow wells lies at a higher elevation than this. Thus, the bottom of the well in front of the north-west door of

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[*] The following gentlemen constituted this Committee:—The Lord Mayor; the Recorder; Alderman Hudson; Rev. W. V. Harcourt; T. Barstow, Esq.; G. Goldie, Esq., M.D.; W. L. Newman, Esq., Actuary; S. Tuke, Esq., Merchant; C. Williams, Esq., Surgeon; B. Dodsworth, Esq., Surgeon; G. Brown, Esq.; T. Laycock, M.D., Secretary.

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the Minster is 12 feet 3 inches deep from the surface of the ground; and the ground is, I believe, about 32 feet above the mean level of the river.

The supply of water from the Artesian wells is so copious that the pump of one of them, as its proprietor, Mr. Nash, informs me, has furnished 100 gallons per minute, for 10 months together, without intermission or diminution, working day and night. The use of the supply is to serve the boilers of steam-engines, the rapid incrustation of which with an ochreo-calcareous deposit, shows the water to be ill adapted for ordinary purposes.

As no analysis has yet been made of this deep water, I have thought it worth while to examine it, and find its constituents such as may perhaps render it serviceable for medicinal use, since it contains, together with a small proportion of bicarbonate of iron, a mixture of Epsom and Glauber's salts, amounting to 48·3 grains in the gallon, that is to say, 33·9 grains of the crystals of sulphate of magnesia, and 14·4 grains of the crystals of sulphate of soda.

Mr. J. Spence has published an account of the principal ingredients in the waters of 20 of the superficial wells in York, from which it appears that of these only five contain any sulphate of magnesia, and that in that which contains the largest quantity of it he did not find one-third of the quantity which I find in the deep springs, and this unaccompanied with any sulphate of soda.

Mr. Spence has also analysed the water of the river Ouse, and has found in it little more than one-fiftieth of the sulphate of magnesia found by me in the deep springs, and no sulphate of soda.

These chemical differences concur with the differences of level at which the waters of the superficial and the deep wells are met with, and at which they stand, to show that they have little, if any, connection with each other, or with the water of the Ouse. The causes of the difference in the quality and ingredients of the three classes of water, as well as of the superiority of the lower springs in volume of water, will be found in the geological conditions under which they are collected.

The section of the beds on which the city of York stands, presented by the borings of the Artesian well at Mr. Swale's factory in Walmgate, is as follows:—

	Feet.
1. Clay and gravel	18
2. Sand, fine river, light coloured, darker	60
3. Sandstone rock, fine grained, white	1
4. Loose sand	1
5. Sandstone rock, as above	58
6. Clay, blue (and water), a thin seam	0
7. Sandstone rock, as above	62
8. Clay (and water), a thin seam	0
9. Sandstone rock, as above	178
	378

This sandstone rock belongs to the beds of the *new red sandstone* formation which crop out in a low line of undulating hills along the western margin of the basin of the vale of York, passing in a south easterly direction from Rainton by Borough Bridge and Ouseburn to Green Hammerton, and emerging again from beneath the diluvial covering of that basin at Bilbrough, within a few miles of York. The immediate substratum of the soil in this line, over a considerable tract of country, consists of these porous beds, and the water which falls or flows down upon it passes through them, between the seams of clay which alternate with the sandstone, along the dip of the strata, eastward to York; it is thus carried beneath the diluvium and below the bed of the Ouse, and is dammed up westward under the superincumbent mass, in the reservoirs of the sandy beds, to the above-mentioned height of 15 or 20 feet above the summer level of the river, to which height it is found to rise where the superior seams of clay are perforated by boring.

The water of the Ouse consists chiefly of the contributions of the rivers which flow from the high hills on the north-west of York (especially the Swale, the Ure, and the Nid), and are fed by the rains falling on their summits. The streams from this source, after percolating the *mill-stone grit*, with which those hills are capped, find their channels on the surface of the impervious beds of the subjacent *limestone* and *shale* along the valleys, and are conveyed on linings of *diluvial clay*, across the edge of the superior strata, and over the drift-covered plain of the *red sandstone* to York.

To this account of the geological conditions under which York is supplied with water is to be added:—1st. That the gritstone hills which furnish the river-water include few materials of saline impregnation. 2nd. That the beds of the red sandstone in which the deep springs run are pre-eminently saliferous. 3rd. That the rubbish of centuries, accumulated in some parts of the city to the depth of three or four yards over the diluvial beds which contain the superficial wells, is full of decomposing matters tending to mineralize and contaminate the water.

The waters of these wells, accordingly, are highly charged with solid matter, amounting on an average to about 60 grains held in solution in an imperial gallon. In two cases Mr. Spence found in them from six to seven grains of Epsom salts, and in one 11 grains; in two others he found 31 and 38 grains of neutral salts of soda and potash. In these last an infiltration may be suspected from the deep springs; but in general there are sufficient materials in and upon the drifted beds to account for the sulphate and carbonate of lime, of which the solid contents of these waters are chiefly compounded, and which render them harder than is desirable either for drinking or for culinary use.

The solid contents of the water of the great springs amount, according to my analysis, to 96 grains in the gallon; and of these one-half are medicinal salts. It is evident, therefore, that it cannot be employed for either of the above-mentioned purposes.

In the water of the Ouse, on the contrary, derived from purer sources, and further purified by the exposure to the air which it undergoes in its course, the whole amount of solid contents held in solution, according to Mr. Spence, is only nine grains in the gallon; and there appears to be no ingredient in it to prevent the supply which it offers to the city from being as excellent in quality as it is unlimited in quantity, were it turned to the best advantage.

At present the public use which is made of it is insufficient to keep the courts and alleys of the city clean, and its domestic use, especially among the poor, is greatly limited by the unfiltered state in which it is furnished from the river by the engine of the Water Company. In this condition it is usually so turbid and dirty as scarcely to be fit for washing, and still less for cooking, or for being drunk. I conceive that arrangements might be made without much difficulty which would effectually remedy this great defect. The invention of *close, hollow, filtering boxes*, constructed of the porous sandstone of Pontefract, jointed with Roman cement, might I think be applied with advantage on a large scale to the building such a box at the waterworks, within or at the level of the river, the water of which would penetrate the six sides of the cistern at a rate which would enable the pump connected with it to supply the city with filtered water; or if the Company would not undertake this, smaller filters of the same description might be placed in tanks of river water, distributed at convenient distances through the city, so that the poor might have easy, and by the help of a rate, cheap access provided for them to an adequate supply of that most indispensable requisite for cleanliness and health, good water.

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If this object were effected, a material obstacle would also be removed to the complete *drainage* of the city.

At present, even in some of the highest parts of it, the same water that supplies the wells forms with the mixed matters that lie in it a black bog, in which the foundations of the buildings rest. Waters standing so near the surface, and breathing out from the organic matter dissolved in it carburetted hydrogen and other gases (as in one case was proved by probing under the floor of the house with a rod, when an inflammable gas issued from the hole), cannot but be suspected of being injurious to the public health. These waters might easily be drawn off by a deeper drainage; but the consequence would be the loss of some superficial wells, which, till the river water shall have been rendered more generally and perfectly available, cannot perhaps be dispensed with.

Attention was drawn to the condition of the drainage in York in the year 1831, when the appearance of cholera was expected; and the following statement on that subject was then made by the Central Board of Health:—"The want of sufficient common sewers, and the general imperfection of the whole drainage of the city is placed in the strongest light by the reports of the District Boards. It is the subject of complaint in every district and almost every parish in York. By this great defect every public and private nuisance is doubly aggravated. The slaughter-houses, dung-heaps, pig-sties, &c., which unfortunately subsist in the heart of the town, are represented in several instances as pouring their fœtid contents into open drains, and the effluvia to be sometimes such as might alone suffice to generate contagion. The dampness also of the dwellings in some of the streets is to be attributed to the same cause, and must be considered as scarcely less prejudicial to the health of the inhabitants. In ordinary seasons these are among the principal sources of the fevers and other complaints which constantly prevail, more or less, in the ill-drained and offensive parts of a populous town; but at a time when the approach of pestilence is dreaded, the most serious and immediate attention ought to be devoted to the improvement of the drainage."

During the twelve years which have elapsed since this statement was published, many new drains have been made, and the Commissioners acting under the City Improvement Act have expended considerable sums in effecting this object; but although the drainage of York has been thus improved at several points, much remains to be done before it can be deemed by any means sufficient. The greatest impediment to its further improvement is created by the damming up of the Foss at the Castle Mills for the sake of the navigation, seven feet above the level of the Ouse; and not only is the drainage of the whole eastern side of the city impaired by these means, but the population are subjected on the sides of the Foss to the influences of a stagnant water, replete with vegetable and animal matters. This has been long felt to be a most serious public evil; it is one which all who have any regard for the health of the inhabitants ought to exert themselves to remove, and it might be removed, I conceive, at a cost from which the rate-payers of the city ought not to shrink.

The last point of sanatory suggestion, to which I have to advert, is the case of that portion of the population of York who have the misfortune to live in the lower parts of the streets bordering on the Ouse, and whose dwellings are continually inundated by the floods: you well know how much the virulence of epidemic and contagious diseases is aggravated under these circumstances, and are aware, I doubt not, of cases in which the use of the limbs has been lost by the chronic disorders consequent on long inhabitation in these houses. In one such case within my own knowledge the house is uncellared, and the brick floor of the room in which the family live retains the damp for weeks or months after the flood has subsided. The evil might be relieved, if it were possible to diminish the height to which the water rises in floods above its mean level by any improvement of the outlet of the river below York: but the inundation is sometimes too great and sudden to be prevented by these means; and it deserves consideration whether houses so situated should not be subjected to the regulations of a sanatory police.

I have now recorded, I think, all the information which I possess relative to the *drainage* and *waterage* of York, and it only remains for me to beg that you will make whatever use you may deem advisable of this communication.

I am, dear Sir, yours faithfully,
(Signed) WM. VERNON HARCOURT.

Bolton Percy, May 1st, 1833.

The following Report on the drainage of York, supplied to the Committee by J. B. Atkinson, Esq., of York, architect, will appropriately follow Mr. Harcourt's communication. Mr. Atkinson says:—

Previously to an Act of Parliament being obtained which placed the management of the city paving, draining, and lighting under the control of Commissioners, the drainage throughout was very inefficient, and although during the last 12 or 15 years about 6000 yards of drains have been constructed at a cost of 2000*l*., raised from the city rates, yet much remains to be done in order to render the sewerage efficient. It is much to be regretted, that in carrying out this important object the regard for economy which it has been thought requisite to observe has materially lessened the utility of what has been done, as the present drains are not such, either in size, solidity, or depth, as the future interests of this important city would call for; and this circumstance will be a great obstacle to future operations. The whole of the drains built during the last 20 years are laid on the vegetable soil, which is of a spongy or boggy nature, and fails in giving that support necessary to enable the drains to retain their form and level. The general dimensions of the drains are 12 × 18 inches to 18 × 21 inches, and they are all executed in 5-inch brick-work, and of a barrel form. The lower portion is generally laid *dry*, and the upper arch turned in mortar. The fall of the drains per lineal yard is about half an inch, and sometimes less; and, on account of the spongy bottom, and the slight and open nature of the brick-work, I believe, the majority are in a very inefficient state. In some of the principal streets, the depth of the drains is from 8 to 10 feet below the street level, whilst in others it is only 5 or 6 feet. These depths are barely sufficient to allow of a drain passing under the cellars of contiguous property, as they should not enter the street drain at the bottom level, but at the top; and in preparing the foundations for new buildings, I have rarely been able to keep the trenches free from water; and it may be adduced from this remark, that the foundations of cellared buildings generally stand in water. The majority of the public drains are discharged into the river Ouse, whilst those in the vicinity of the river Foss empty themselves into it. This latter river is retained at a level seven feet higher than the Ouse, by lock-gates placed at Castle Mills-bridge, which locks have a detrimental effect on the drainage of that part of the city near this river; and it is a well-known fact that the vicinity of the lower portion of Walmgate, Hungate, and the Foss Islands is frequently the seat of disease, owing to the exhalations from the damp. The streets of North-street and Skeldergate are likewise subject to be flooded from the river Ouse occasionally, and much inconvenience results therefrom, but I presume no remedy could be applied to this evil without sacrificing the interest of the navigation. In carrying any more efficient project of draining into effect, advantage cannot be taken of the contour or anticlimal lines of the ground on which the city stands, but it will be imperative to lay any future drains in the line of the present streets; the relative levels of different parts of the city being previously ascertained.

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Inefficient as the sewerage of the city is, it is rendered more so by the fact that back courts and streets, and many dwellings have no side drains communicating with the main sewers already formed. The remarks of the District Visitors, acting in connection with the Sanatory Committee, amply show to what an extent this serious evil, so easily remedied, is allowed to exist, and apparently without any means being adopted to remove it. In fact, the description of the state of the city in 1831, as given by the Cholera Board of Health, may be applied with general correctness to its present condition. It is manifest that immediate, energetic, and systematic measures are more requisite than inquiry.

The houses of the higher classes and all the more respectable houses recently built have water-closets which empty into drains or cesspools. In the newly built ranges of cottage tenements, one privy is appropriated to from four to eight, twelve, and even fourteen families; sometimes, however, there is a privy to each house. The position of the privy is selected evidently without any reference to the health or comfort of the inhabitants. In a new range of cottages in Long Close-lane, there may be seen the door of the common privy at each end exactly opposite to the door of a tenement, so situate that it is impossible there can be any ventilation. In "Plow's buildings," the privies of the houses are in front. The soil-holes are usually open, and run over, and flood back courts (as in Court, No. 46, Hope-street, Beedham's-court, Skelder-gate, &c.) In St. John's-place, Haver-lane, during wet weather, the privies have to be emptied by buckets into the open channel in the middle of the street. In the Water-lanes there are several houses *without* privies, so that the inhabitants have to use those of their neighbours by stealth, or go into the street. The pig-sties attached to numerous cottages and yards constitute a most unnecessary and unpleasant nuisance. If the cottagers and others were to sell their offal food to pig-feeders in the country, as they sell their manure, the profits would be much greater, leaving their improved health out of consideration altogether. The extracts from the District Visitors' books, previously referred to, further strongly elucidated this part of the inquiry.

. The courts and alleys inhabited by the poorer classes are cleaned by appointed scavengers. The night-soil is retained, giving off its impurities, until a sufficient quantity is accumulated, when it is removed from the yard during the night in barrows (and this is the method also in private houses), and put into the street; from thence it is carted away to large dung-hills within the city. There is an immense heap of this kind at the side of the river Foss, close to Layerthorpe bridge, and the inhabitants all around complain loudly of the stench. There is another such dung-heap behind St. Margaret's church, which quite pollutes the atmosphere around it. Minor similar heaps are placed (for the convenience of water-carriage) in the neighbourhood of the Foss, into which the liquid contents of all are discharged. The night-soil of the city is usually sold to the proprietors of these dunghills, who are manure merchants by trade. Sometimes the inhabitants of a court, having a common privy, sell the soil from the soil-hole, and appropriate the proceeds to the payment of the water-rates; in other cases the landlord of the tenements takes the night-soil, and in return pays the water-rates. A load and a half is on the average taken from each house annually, and the cost of getting out and loading is about 2*s*. per load; so that the city pays at least 900*l*. per annum for this labour. The annual value of the manure of all kinds made in the city cannot be less than 8000*l*. to 10,000*l*. In addition to the night-soil, there is the manure of pigsties, cowhouses, and stables, all which are found in great numbers in the courts and yards, especially of the poorer classes.

The City Commissioners are vested with powers for the enforcement of cleansing and the prevention of public nuisances; but it appears from the statements just made that these powers are inadequate to the full attainment of the object in view.

Houses are built both in wide streets and in narrow courts. To some cottage tenements lately built there is no drain or sewer in the street, it is also unpaved and so full of ruts and ashes and all kinds of filth as to be quite impassable to pedestrians or even to persons on horseback. The road is higher than the adjoining yards, and the filthy mud flows into the back premises and even houses in the next street. A case of typhus fever in a father of a family inhabiting one of these houses terminated fatally, and subsequently, in the same house, a case of malignant scarlatina occurred.* The City Act gives no control over the builders of houses, nor can they be compelled to sewer, drain, or prepare the ground in any way for the health and convenience of the inhabitants except as their own judgment dictates. The consequence is, that several new streets in York are unpaved and undrained, full of deep holes, ruts, and mud, and traversed with difficulty even by carts.

There are no cellar dwellings in York, unless the cellar kitchens of the more newly-built houses come under that designation; none are inhabited by the poorer classes. The latter principally occupy the large houses and their out-buildings, formerly the mansions of the wealthy, and now sublet as apartments. Houses of this kind abound in various parts of the town; very few have sewers. Beddern (or as it was formerly called Beddern *College*) a cluster of buildings originally occupied by ecclesiastics attached to the cathedral, and once a fashionable

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* Since writing the above a sewer has been commenced.

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quarter, is now sublet in this manner. Of 98 families living there, 67 have only one room for all purposes, 18 two rooms, and 13 three rooms or more. One entire building is let off in single rooms. The stair-case windows are so made that they cannot open, the rooms are low and confined, the light of day almost excluded, and the walls and ground damp and undrained. The building is occupied by 16 families, two abominably filthy privies being appropriated to all, and situate, with their accompanying "ash-hole" or "bog-hole," in a little back court. As might be expected, the smell in rooms of this kind is most disgusting and oppressive. Against the back wall of a cottage there is sometimes a dung-hill, the fluid from which soaks into the house. Indeed, this circumstance is repeatedly complained of by poor people.

The District Visitors visited 1636 houses occupied by 2195 families in ten districts in York, of which number 202 were sub-let; they also inquired the number of families with one, two, and three, or more rooms respectively, and the sleeping accommodation.

From these inquiries it appears that in the parish of St. Dennis, in which strict accuracy was observed, from 8 to 11 persons slept in one room in 4½ per cent. of the families resident there; in 7½ per cent. from 6 to 8 persons slept in one room; of the total 2195 families visited by the district visitors, 26 per cent. had one room only for all purposes; the highest proportion in one room was in Beddern, being 68⅔ per cent. the lowest in the parish of St. George, inhabited principally by artisans and small shopkeepers, where it was 2½ per cent. Table 1 (Appendix) shows the average number of persons in one family in each of the districts inspected. The mean average is 4·12 persons; the highest (4·61) is in the parish of St. Dennis, the lowest (3·24) in the Castlegate district.

The rent of a single room used as a residence varies from 6*d*. to 2*s*. per week; the usual rent is 1*s*. to 1*s*. 3*d*.; in some clusters of buildings the amount of weekly rent is nicely graduated according to the comfort of the room or the accomodation it affords, one room being let for 9½*d*., while another adjoining is charged 10½*d*. per week. In 11 per cent. of 1545 dwellings reported on by the district visitors, the state of repair was represented as indifferent or bad, and of 1418 dwellings, 460, or 32½ per cent. were noted as being damp and cold.

From the answers given to the visitors it was found that in the lowest districts nearly 27 per cent. of the families had not resided one year, and 37 per cent. had been less than two years in their present residence. This frequent removal alone must amount to a heavy annual tax upon the income, time, and comfort of the poor. It appears to be caused in a great measure by the discomfort or unhealthiness of their previous

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dwellings; at least that is the reason usually given for the change of residence.

The general state of the air in the dwellings of the poorer classes, as is amply shown by the observations of the District Visitors, is bad; the courts and yards are confined, the inhabitants numerous; the privies, sewers, and drains defective, the latter, indeed, generally wanting; and yet there is usually an evident desire to keep all clean and neat as possible, even under circumstances the most unfavourable to personal and domestic cleanliness. There were some instances of extreme poverty observed in Beddern. In a yard, also, in Hungate there was a family without either bed or bedding, and in another a man, his son, aged 18, and his two daughters, aged 10 and 15, occupied one bed made up on the floor. In St. Margaret's a family of seven were found in one room with no other bed than a few shavings in a corner.

Coal is cheap in York, and may be purchased of a sufficiently good quality for from 6*s.* to 9*s.* a ton; it is the usual fuel of the people. Gas-light is extensively used in the houses and shops; but no escape is provided for the bad air which it produces.

It may be proper to mention the nuisance occasioned by the smoke from chimneys belonging to breweries, bakehouses, foundries, gas and glass-works, steam-engines, &c., as per list:—

Steam-engines.	28
Glass-works	2
Iron-foundries.	3
Coach-manufactories	6
Pipe-manufactories	3
Bakers	25
Confectioners	7
Brewers	14
Smiths	35
Total	123

It does not appear that the smoke is burnt in any of these except one.

The quantity of soot which falls is very great. Some idea of the amount may be learnt from the fact that a drawing-room window not having been opened for two or three months, the soot had collected between the bars just as in a chimney, the current of air passing from without into the room being loaded with and depositing the soot there as it passed through the bars. The pollution of the air from this source must be extremely great, and injurious to the health. The injury done to furniture and clothing, and the additional cost of washing, must form no inconsiderable item in the expenditure of the citizens. The total amount, on a very moderate estimate, cannot amount to less than thousands per annum.

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The sites of the public school-rooms in York (30 in number) for the children of the labouring class, are mostly open, well drained, ventilated, lighted, and warmed. There are but few private schools for this class of children, and those which exist are small and very fluctuating.

The public buildings are the cathedral and 23 churches, 13 chapels, a theatre, a suite of assembly rooms, concert room, a suite of banqueting rooms, the museum of the Yorkshire Philosophical Society, and several halls for holding public meetings. There are also the County Prison, the City Gaol, the Guildhall, the Lunatic Asylum, County Hospital, City Dispensary, almshouses, usually termed hospitals, &c. Their sites are indicated in the map of the Ordnance Survey. The ventilation of these buildings is various; in some, especially the older, it is insufficient, as, for example, in the Workhouse and County Hospital. In the yard of the latter there is a large cesspool. Some of the almshouses have been rebuilt with some regard to this important point, as Lady Hewley's charity, Wilson's Hospital, &c. The workhouse has been improved as far, probably, as the nature of the building will admit. But the character of its ventilation may be inferred from the following remarks of the District Visitors:—"The female patients' day and night-room is ventilated through the women's infectious room;" and "the infectious room for women is ventilated through the sick aged women's day and night-room." From this it appears that those to whom pure air is of the greatest importance, namely, the sick females, have it the most impure.

The state of the parochial burying-grounds of York must have a considerable and noxious influence on the atmosphere within the churches, and on that of the city generally, and on the water. The greater number of these grounds are of extreme antiquity, and must have been buried over very often. In fact, many of them are raised above the street level from the accumulated remains of generations. That of St. Michael, Spurrier-gate (now closed), is at least three feet above the floor of the church. A few years ago the ground of St. Helen, Stonegate, was raised three feet by fresh soil in consequence of the great number of bodies placed there. York having now an excellent cemetery, a strong feeling is very generally expressed against the continued use of these grounds for the purposes of interment. Graves are dug in the public thoroughfares and putrescent human remains exposed; nor is it an uncommon circumstance to see bones lying about. The analysis of the water from wells near St. Cuthbert's and St. Sampson's churchyards, shows that the wells are tainted by the drainage from these burying grounds, and there can be no doubt that the air is also polluted, not only by the direct emanations, but as well from the drainage from the bodies into the public sewers. Indeed, individuals have stated that they perceive the stench as they pass along the street.

York enjoys several public walks. In addition to the common lands, amounting to several hundreds of acres, possessed by the freemen of the city, and which are used, during a part of the year at least, for cricket grounds, &c., there are St. George's Fields and the New Walk planted with trees, and having seats, extending above a mile along the east bank of the river Ouse; the opposite bank of the river has also a footpath, and towing-path along its edge, used as a public walk, and the old city ramparts, (for a length of a mile, or nearly,) have been repaired, and made into a dry flagged walk, commanding a view of the city, and the surrounding country. The grounds on the north side of the minster and the walks in the cemetery are open to the public, but admission to the gardens of the Philosophical Society is limited to members, and their families and friends, except on certain public occasions. Non-subscribers pay 1*s.* for admission. In addition to these promenades and grounds, the approaches to the city and numerous footpaths afford agreeable walks. The river Ouse presents great facilities in summer for aquatic excursions and rowing matches.

A convenient swimming-bath and shower and douche-baths were established by a company in the year 1837, on a portion of the manor shore adjoining the grounds of the Yorkshire Philosophical Society. The annual subscription is from 5*s.* to 15*s.* per annum, and a single ticket costs 6*d.*; on Saturday afternoon the charge is 2*d.* There is no provision, however, for warm bathing (and this is generally regretted by those who appreciate its importance) except at the water-works, where the charge for a warm slipper-bath is 2*s.*, or for the season 25*s.*; for a tepid plunging bath 1*s.*, for the season 1*l.*

The rivers Ouse and Foss are both bathed in, and in summer the conduct of the bathers in the former is much complained of, by pleasure parties on the river.

Water is supplied to the city from wells and cisterns, but principally, for all purposes, from the river Ouse, by a company first established in 1677, and subsequently by Act of Parliament. The wants and wishes of the poor in those districts inspected, as made known to the District Visitors, may be found in their proper place. It appears, from the answers of the clerk of the company, to the questions of the Commission, that iron mains of 11 inches and of 3 inches are laid in the principal streets, and lead service pipes to about 3000 houses; the total number of houses in the city being nearly 7000. The greater number of the houses supplied from the water-works have cisterns, but many of the smaller have no cisterns, and only taps in the yards.

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The annual charge made by the Company appears to be about 9*d*. or 1*s*. in the pound of the rental; it varies according to the class of houses from 4*s*. to 5*l*. A six-roomed house at 13*l*. rental, pays from 8*s*. to 10*s*., a cottage of two rooms, the rental of which is from 4*l*. to 5*l*, pays 4*s*. or 5*s*. for water supplied to a tap in the yard for a limited time every day, except Sunday. The time seems of various duration; some persons complained to the District Visitors that the water was on occasionally for 10 or 15 minutes only. The poor in the neighbourhood of the rivers get their water from thence, otherwise the water-works company have a monopoly of the supply of river-water to the city. Filters are used in private houses of the middle and higher classes, but not often by the poor, who complain of the muddy state of the water.

Mr. Spence, who analyzed the waters of York, states that the water of the Ouse is remarkably pure when at its summer level, containing less solid matter, in fact, than the water of either the Thames or the Clyde. In time of floods, it holds a large amount of alluvium in suspension, and is not fit for domestic use without filtration. The water of the Foss is impure, even if taken two miles above the city.

A few principal streets are watered, under the direction of the city commissioners, by water-carts supplied from the pipes of the company. No means are adopted to wash, or cleanse the streets by flooding them. There are no means, except the common fire-engine, for throwing water to a height; for although a steam-engine of 20-horse power forces the water into the city, that power cannot be made available in case of fire, as the larger mains having an 11-inch bore, and the smaller only three, it is apprehended, perhaps erroneously, that the latter would burst if the necessary pressure on the water were applied. The mains, however, are always full, and the steam-engine may be put in motion in 15 minutes at any time, and any quantity supplied from the river to all those parts of the city and suburbs to which the company's mains extend.

The sanatory condition of the population in York may be considered under several different heads. The density and wealth in any given district will materially influence the health of the inhabitants; the two indeed are generally in an inverse ratio to each other; and with the density all the causes which aggravate the mortality of a district are increased. The employments of the population also merit special consideration. As regards the duration of life in different classes, it appears from the following table (which has been carefully drawn up from the mortuary registers of 1839, 1840, and 1841), that the mean age at death of the artisan class is 26½ years less than that of the gentry and professional class. Labourers in York live on the average 8¼ years less than labourers in the country.

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TABLE 1.—ABSTRACT of the DEATHS in the York Registry District during the Years 1839, 1840, 1841; distinguishing the Station in Life and the Locality, whether Urban, Suburban, or Rural. Total Population of the District, 47,706.

	—	Total Number of Deaths from 1839 to 1841 inclusive.	Per Cent. of Deaths under 15 Years of Age.	Per Cent. of Deaths from Epidemic and Contagious Diseases.	Average of all of each Class dying above 21.	Average Age of all of each Class.	Average Age of all in each District.
Town Population, York City, 29,329	Gentry and professional persons and their families	146	23·28	11·64	64·85	48·62	32·21
	Tradesmen & their families.	429	46·38	22·14	56·72	30·76	
	Artisans and their families.	798	57·89	25·06	51·76	22·10	
	Persons whose condition in life is undescribed . .	521	34·74	11·55	57·28	35·82	
	Labourers and their families	504	56·94	21·23	54·02	23·75	
Suburban Population, 8421	Gentry, &c., and their families	40	15·00	12·50	62·03	49·20	36·40
	Tradesmen, &c., and their families	104	30·77	14·42	55·95	39·54	
	Artisans and their families .	64	54·69	23·43	46·44	20·65	
	Persons whose condition of life is undescribed . .	87	25·28	10·34	60·63	41·93	
	Labourers and their families	188	44·68	26·59	60·65	30·68	
Rural Population, 9956	Gentry, landowners, and their families	29	13·79	20·69	56·45	44·86	38·65
	Farmers, village tradesmen, and their families. . . .	243	32·51	19·75	59·44	39·10	
	Agricultural labourers and their families	279	40·86	15·05	55·18	31·99	
	Totals	3,432	..	..	..	..	..
	Averages	..	44·84	18·03	57·03	35·30	..

The whole Union.
Proportion of annual Deaths to the Population. 1 in 41·70
Proportion of annual Births to the Population . 1 in 39·34
General average age at death . . . . . . 35·30 years.

The following table exhibits the less healthiness of York, as compared with the surrounding rural districts. The average or mean age of all dying in York is 6½ years less than of those dying in the country, and the deaths from epidemics more numerous.

TABLE 2.—Showing the relative Sanatory condition of the Urban, Suburban, and Rural Districts of the York Union.

—	Per Cent. Dying under 15 Years of Age.	Per Cent. of Deaths from Epidemics.	Average Age at Death.	Proportion of Annual Deaths.	Proportion of Annual Births.
In the City of York	48·49	20·00	32·21	37·77	33·87
In the Suburban Districts . .	37·06	19·46	36·40	55·28	52·63
In the Agricultural Districts .	35·75	17·49	38·65	51·32	45·85

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The causes of the unhealthiness of York, as compared with the country, have in some degree been indicated. Bad sewerage and drainage, bad water, bad air, not only from the decomposition of refuse animal and vegetable matter, but from the crowding of the artisan class into a confined space. In addition to these noxious agencies, their employments and their workshops are often unhealthy; sickness makes them poor, and their food and clothing are consequently scanty. It is difficult to estimate the influence of all these causes on the health in York. The city is divided into wards and parishes, and in these good streets and bad streets, open thoroughfares and gardens, and densely populated badly ventilated courts, are closely intermingled.

There is no standard by which deficient drainage can be measured. The natural drainage, as well as the sewerage, or in other words, the varying altitude of different parishes will indeed have an influence on the health of the inhabitants, and so the altitude may (though not without many exceptions) be taken as the standard. Even when two districts are closely contiguous and sewered alike, and inhabited alike, a difference in the fall, it may be inferred *à priori*, will be accompanied by a difference in the viability of the people in the two parishes, for the lower-lying parish will not only receive the drain water of the upper as well as its own, but the deposit from water thus charged with impurities will move more slowly along the sewer than the former, and therefore receive a larger quantity of foul air. Trapping the sewers will not altogether prevent the malaria escaping, as it is satisfactorily shown in Mr. Chadwick's supplement to his General Sanatory Report on the health of the labouring population of Great Britain, that water will drain into sewers through the brick-work, and if water will pass in, we may be quite sure that the air will pass out. Indeed Dr. Reid detected the escape of deleterious miasm from a grave 20 feet deep. Independently of these considerations, it is certain that in York the low-lying districts are inhabited principally by the poor, and are really the worst sewered districts.

The site of the city of York is of a very varied character. The raised ground to the south-west bank of the river is sand and gravel, on the north-east clay and gravel. The parishes of St. Mary Bishophill, junior, St. Mary Bishophill, senior, Holy Trinity, Micklegate, and St. Martin with St. Gregory, are situate on the south-west declivity to the river, the highest ground opposite the parish church of Holy Trinity Micklegate, being 49 feet above the summer level of the river, and 65 feet above the datum plane of mean tide. At the foot of this declivity, close to, and parallel with the river, are the parishes of All Saints, North-street, St. John Micklegate, and a small part of Bishophill, senior. On the opposite side of the Ouse, are the parishes of St. Mary Castlegate; St. Michael Spurriergate; St. Martin Coney-street, St. Helen Stonegate, and St. Michael le Belfrey, the latter containing the highest point, (52 feet above the level of the sea,) on the north-east side of the Ouse. From this parish the ground declines through the parishes just mentioned, except St. Mary Castle-gate, to the Ouse on one side, and through part of St. Helen, Holy Trinity Goodramgate, Holy Trinity King's-court, St. Crux, St. Saviour, St. Maurice, and St. Cuthbert, to the river Foss, on the other side. Portions of St. Sampson, All Saints Pavement, and St. Mary Castlegate, have also a declination to the Foss. The drains from the parishes of St. Dennis, St. George, St. Margaret with St. Peter-le-Willows, and St. Lawrence with St. Nicholas, empty into the Foss exclusively, and, in common with the barracks, are situate on an almost level plain, backed up by a ridge of hills, similar to those on the south-west side of the city. There is a great deal of made ground between the banks of the rivers Foss and Ouse. Coney-street, in the parish of St. Martin, which runs parallel to the north-west bank of the Ouse, is raised not less than nine or ten feet above what appears to have been the surface in the time of the Romans. A regular pavement was discovered about 40 years ago, between the river and St. Helen's-square, at a depth of seven feet; and about the same time, when a deep drain was made along Newgate, a Roman street was discovered with channel tiles. When Parliament-street was built, the nest and eggs of a wild duck were found 12 feet below the surface. And there can be no doubt but that originally the whole tract of land between the Ouse and Foss, was marshy, and that a great proportion of the parishes of St. Cuthbert and St. Saviour, now thickly inhabited, was, up to a comparatively recent period, a marsh formed by the Foss. The Saxon name Peaseholm, sufficiently indicates this with regard to the former; and the church of St. Saviour was formerly called Ecclesia Sancti Salvatoris in Marisco—the church of St. Saviour in the Marsh. In fact, the whole depth of the made ground in this district has rarely been penetrated either when building or draining.

In table 5 in Appendix I have endeavoured to give data for estimating the difference in salubrity of different localities, and the causes of that difference.

For the better understanding of the subsequent tables I here subjoin the totals and averages of the whole city.

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TABLE 3.

Population.	Mean altitude above the Sea in feet.	Inhabitants per rood occupied by Buildings.	Inhabitants to one Birth annually.	Inhabitants to One Death annually from			Per Cent. living aged under 5 Years.	Per Cent. dying aged under 5 Years.	Per Cent. of Deaths of Artisans and Labouring Classes.	Mean Age at Death.
				All Causes.	Epidemics.	Pulmonary Diseases.				
28,952	44	37	33·87	37·77	187	181	11·76	42·16	54·39	32·21

The per centage of the total deaths which were from the artisan and labouring class in each parish, with the mean age at death, coincide approximately with the domestic condition of the population generally in each parish, as regards ventilation, &c. The density of the population will also be observed to have a connection with the mortality of the artisan and labouring classes and the mean age at death, but particularly when conjoined with a low altitude, or with what in the table must be considered a convertible term, namely, deficient sewerage and cleansing. The mean age at death is manifestly dependent upon the distribution of the living as to ages; but by the column showing the annual proportion of births, it will be seen that this is higher wherever *à priori* the locality would be thought unhealthy. The per centage of living and dying, aged under five years, in the families residing in such localities is of course greater, and the mean age less.

It may happen, however, that the population is not a reproductive population from a preponderance of unmarried adults. In this case, it is manifest that neither the average age nor the annual proportion of births or deaths will express the sanatory condition of the locality; it is to meet this case, that I have added two columns showing the proportion of deaths from epidemic and pulmonary diseases. I need not here explain how much the fatality of both these cases of death is increased by deficient ventilation and miasmata. It will be seen that these two columns present the most uniform results, and have a reciprocal ratio.

A comparison of two parishes will illustrate my meaning.

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TABLE 4.

—	Mean Altitude.	Population to Square Rood.	Inhabitants to one Annual Birth.	Inhabitants to one Annual Death			Mean Age at Death.	Labouring Class per Cent.*
				From all Causes.	From Epidemics.	From Pulmonary Diseases.		
Holy Trinity, King's Court	53	43	38·92	47·80	171	207·5	38·07	56
All Saints, North Street	39	143	24·82	36·40	100	164·2	19·56	78½

* Includes artisans as well as labourers, properly so called.

All Saints, North-street, it will be seen, is in every column below the mean of the city; Trinity is below the mean in one only, the mortality from epidemical diseases. The single statement that the shambles, made up of narrow streets and filthy yards, are situate in this parish, will explain the matter at once. That the prevalence of epidemical disease during the three years (1839—1841) in this parish was not accidental, is confirmed by the fact, that in common with North-street, it was one of the localities in which cholera appeared the earliest.

On comparing the altitudes with the indexes of healthiness or the contrary, it will be seen that the mean age diminishes, and the proportion of births, of deaths from all causes, and of deaths from epidemics, increases as the altitude is less. Taking the deaths from epidemical and pulmonary diseases as the standard by which the efficacy of drainage may be measured, two high parishes adjoining the Ouse and two low adjoining the Foss stand as follows:—

TABLE 5.

	—	Population to Square Rood.	Mean Altitude.*	Inhabitants to one Death Annually		Mean Age at Death.
				From Epidemics.	From Pulmonary Diseases.	
High.	Holy Trinity, Micklegate .	24	45	404	281·2	42·58
	St. Martin cum Gregory. .	32	34	213	346·2	41·89
Low.	St. Saviour	50	16	142	231·9	23·62
	St. Cuthbert	40	13	103	120·1	22·47

* From the summer level of the Ouse and Foss.

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There can be no doubt that deficient ventilation, even in well-drained districts, will increase the mortality from epidemical and pulmonary diseases; but it is not generally remembered that the effects of deficient drainage are not to be avoided by good ventilation. In proof of this, the following facts will probably be deemed conclusive. The village of Rufforth, near York, is very badly drained, a wide stagnant ditch passing through the village. It is situate in a slight hollow, on a level plain, bounded by Marston Moor, Askham Bogs, &c. The village of Acomb is about two miles distant from Rufforth, and is situated on an eminence, overlooking the level. Both of course are as well ventilated as country villages usually are, but Rufforth being less populous, and more agricultural, has of the two the advantage in this respect.

TABLE 6.

——	Population in 1841.	Altitude in Feet.	Inhabitants Living to One Annual Death from		Mean Age at Death.
			All Causes.	Epidemics.	
Rufforth	276	61	34	69	28
Acomb	774	110	41	258	35½

The scarlet fever, when epidemic in Rufforth, was so malignant as to be fatal in a few hours, and was termed by the villagers the "black" fever.

On the other hand, the town of Birmingham is an example, in proof that a very good natural drainage may diminish the noxiousness of a dense population. The only cases of cholera that occurred in that town were imported. The centre of the borough is 475 feet above the level of the sea.

It will be seen from the table that the labouring classes reside in the lower altitudes, and that the density of the population increases also as we descend. This is most obvious in the two extremes of the scale. The intermediate parishes have varying altitudes and varying densities. Some of these, however, strikingly illustrate the effect of deficient sanatory arrangements. The parishes of St. Peter the Little, and All Saints Pavement, are contiguous and alike as regards the facilities for good drainage. In the one, there is, however, deficient drainage and narrow streets; in the other, tolerable drainage and wider streets.

The following table shows the sanatory condition of each:—

TABLE 7.

—	Mean Altitude.	Population to Square Rood.	Inhabitants Living to one Death Annually		Mean Age at Death.	Per Cent. of Deaths of Labouring Class.
			From all Causes.	From Epidemics.		
All Saints, Pavement .	47	23	62·61	313·53	30·30	55·0
St. Peter the Little .	47	70	44·07	172·07	25·28	58·4

So that the average duration of life for each individual living in the parish of St. Peter the Little is five years less than if he resided in the adjoining parish. It will be seen from the deaths of the labouring class, that the proportion of the living of that class is nearly the same in the two parishes. There is also a crowded churchyard in All Saints. The difference in the sanatory condition of the two parishes can only be accounted for by the bad ventilation and drainage of St. Peter the Little.

About 12 years ago, when the York Improvement Act was obtained, the site of the present market (part of which is in All Saints) was covered with streets resembling those in St. Peter the Little. We can see that the sanatory effect of that great improvement has been to raise the mean age at death considerably.

Although these results are obtained from a small population, and a limited extent of the city, there can be no reason to doubt their accuracy, but rather the contrary, for the more limited the field of the inquiry the more precise may be the analysis. If, however, the whole city be taken, the general results are the same.

TABLE 8.

—	Mean Altitude.	Population to Square Rood.	Mean Age at Death.	Ratio Dying under 5 Years to Living at the same Age.	Inhabitants to one Birth Annually.	Inhabitants to One Death Annually			Deaths of Labouring Class per Cent.
						From all Causes.	From Epidemics.	From Pulmonary Disease.	
Best drained and ventilated parishes	50	27	35·32	3·03	47·50	54·32	347·72	334·22	40·2
Intermediate parishes	43	40	27·79	3·86	36·53	41·41	247·20	219·70	52·5
Worst drained and ventilated parishes	33	63	22·57	3·83	26·82	32·15	129·43	153·00	62·8

It will be seen that as the altitude diminishes, the proportion of the labouring class is greater, and the mean age less. The two extremes show a difference of 12¾ years in the mean age of

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each individual dying. The intermediate parishes comprise every variety of site and population. The parish of Bishophill Senior, for example, varies in altitude from 54 to 26 feet. If the deaths in one of these intermediate parishes be arranged according to altitude, they are as follow :—

Table 9.

An Intermediate Parish.		Mean Altitude.	Inhabitants to One Annual Death		Mean Age at Death.
			From all Causes.	From Epidemics.	
Bishop-hill Senior	High part .	54	43	260	27½
	Low part .	30	41	150	24½

The same results are seen if the healthy parts of all the intermediate districts be separated from the unhealthy.

Table 10.

——	Mean Altitude.	Population.	Inhabitants to One Annual Death		Mean Age at Death.
			From all Causes.	From Epidemics.	
Best conditioned portion of the intermediate parishes . . .	49	4858	43·91	323·86	30·48
Worst conditioned portion of the intermediate parishes . . .	38	6871	37·08	177·08	27·35

To show further the connection between deficient sanatory arrangements and disease, the localities of the cases attended by the medical officers of the dispensary for the five years, 1839-43, have been tabulated; and it will be seen that the annual expenditure of this charity is almost exclusively in the badly drained and badly ventilated parts of the city. In the higher altitudes and well-conditioned districts, the cases of fever, &c., were only 15 per 1000; in Walmgate district, east of the Foss, there were 73 per 1000; in the Hungate district, on the west bank of the Foss, the cases averaged 91 per 1000. (See Table 6, App.) The tabulation of the residence of the poor attended by the medical officers of the Union shows, also, that the medical charge on the poor-rates is principally from the ill-conditioned districts. The residences of 349 persons who received sick relief from six benefit societies during the year 1843 are arranged below in a tabular form with similar results :—54 members, living on the west bank of the Foss, received 3*l.* 2*s.* each; 40 persons, living in the best-conditioned districts, were paid only 1*l.* 7*s.* 10*d.* each. These numbers comprise

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only a few of the sick relieved by these societies, as the following enumeration of those from which no returns have been obtained will show.

	Courts or Lodges.
Independent Order of Odd Fellows	8
Grand United Order of Odd Fellows	3
Ancient Order of Foresters	5
Ancient Order of Free Gardeners	5
Ancient Order of the Ark.	4
Ancient Order of the Druids	1
Friendly Benefit Societies	8
Total	34

The cost of deficient sanatory regulations to the provident poor is a Rule of Three question :—If 167*l.* 6*s.* be expended in the badly-drained districts, on sick members annually, by six friendly societies, how much will 34 expend?

Table 11.—Showing the Number of Sick Members of Six Benefit Societies in Six Districts, during the Year 1843; the Duration of Sickness; and the Allowance received.*

District.†	Mean Altitude of District in Feet.	Number Sick.	Per Cent. Sick to the Total of 2385 Members.	Average Duration of Sick-Pay to each in Weeks.	Sums Paid per Head during Sickness.		
					£.	*s.*	*d.*
1. Streets and courts (Hungate, &c.) adjoining the west bank of the river Foss	29	54	·022	15·27	3	9	0
2. Walmgate, and its courts and lanes east of the Foss . .	31	43	·017	7·93	2	4	8
3. Streets and courts (North-street, &c.), adjoining the banks of the river Ouse . .	34	71	·029	9·50	2	6	8
4. Old streets and courts, imperfectly paved and drained .	44	62	·026	9·24	2	6	7
5. New streets and courts, imperfectly paved and drained .	46	79	·033	7·87	1	19	4
6. Streets not included in the preceding, comparatively well-drained and paved . .	53	40	·016	5·87	1	7	10
Totals and Means . .	..	349	·146	9·00	2	5	0

* The benefit societies are the following:—The York Female Benefit Club; the York Amicable Society; the York Female Friendly Society; the Lord Dundas's Union; the New Union Benefit Society; the York Brotherly Society.

† For the limits and sanatory condition of these districts, see the Dispensary Table in Appendix No. 6.

It is impossible to ascertain the amount of losses of rent and rates from the poorer classes of tenements by interruptions in the employment of the inmates, and the expenses occasioned by sickness and mortality. The subjoined Table is a return from the Union, in which particulars bearing on this point are stated:—

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TABLE 12.—RETURN from the Board of Guardians of the York Union.

	Number of Husbands or Fathers who have died below 60 Years of Age.	Average Age of the Husband or Father at Death.	Average Age of Period of Dependence.	Total Amount of Relief given since the commencement of the Relief.
		Years.		
Total number of persons at present on the out-door or in-door relief list, relieved on account of claims for relief arising from widowhood	176	43	Average period of dependence actually experienced 7⅓	Not known.
Total number of children belonging to widows in receipt of parochial relief.	..	..	..	..
Total number of children relieved whose fathers and mothers are dead	..	..	..	..

TABLE 13.

		Weekly Cost.	Annual Charge.
		£. s. d.	£. s. d.
1. Total amount of relief given to persons at present dependent on parochial relief		188 0 0	..
Widows . . . . . 303 Children of widows . 246	. . . . . .	59 4 11	3080 15 8
Orphans 41	. . . . . .	28 6 9	1474 11 0
		..	4555 6 8

TABLE 14.

	Year ended Lady-day, 1839		Year ended Lady-day, 1840		Year ended Lady-day, 1841	
	Cases.	Money expended.	Cases.	Money expended.	Cases.	Money expended.
		£. s. d.		£. s. d.		£. s. d.
1. Total number of cases which have been attended by the medical officers of the Union	606	241 6 0	553	172 10 0	513	171 0 0.
2. Total number of cases in which support has been given on account of sickness during the last three years	122	. .	229	. .	187	. .
3. Number of cases in which coffins have been given .	4	2 5 6	7	5 6 6	6	3 2 6
4. Total number of cases in which the whole expense of interment has been provided at the public charge	45	63 0 0	51	54 15 1	45	53 14 9

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The total annual charge on the Union for the year ending March, 1843, being 11,634*l.*, the total average annual expense of cases of widowhood and orphanage upon the Union is nearly 30 per cent. of the total annual expenditure. This is, of course, but a very small proportion of the cost to the community of deficient sanatory arrangements. If the distress and destitution experienced by widows and orphans in private could be accurately estimated, the amount would be incredibly great.

Medical advice is given gratuitously to a great extent by the medical profession generally, and also by the City Dispensary and County Hospital. The latter takes in patients from any part of the county: the Medical Staff prescribe also for the out-patients of the charity, the greater part of whom reside in York. The advantages of the dispensary are confined almost entirely to the sick poor of the city; those unable to attend at the institution are visited at their homes. There is also a small district dispensary: it is not, however, a public institution.

The following is the average annual expenditure and number of patients of the two medical charities:—

TABLE 15.

——	Average Annual Number of Patients for Five Years.	Average Annual Expenditure of Five Years.
		£.
York County Hospital	974	1496
York City Dispensary	2119	574

York having had for many centuries a municipal government, and as a commercial and military locality having partaken in all the social changes of the kingdom from time immemorial, it is an interesting question to determine how far the better, although unsystematic sanatory regulations of later years, have been followed:—1st, By a concomitant improvement in the general health; and, 2ndly, By a greater immunity from epidemics. The former may be inquired into in various ways. First, the general rate of mortality at successive periods can be compared with that of the present time, and the mean age at death in each parish with the general mean.

Drake, the historian of York, has given the number of births and burials for seven years, from August 5, 1728, to August 5, 1735; during this period, the average annual excess of burials above births was 98; and calculating the then population in the ratio of 1 birth to 27 inhabitants (the ratio of all large cities), the deaths were 1 in 21·77, or 498 annually to 10,800.

In 1777, Dr. White of York communicated a paper to the Royal Society of London, in which he compared the mortality of York for the seven years from 1770 to 1776 with the tables of Drake. He estimated the population of the city by two different methods, at 12,798, being an increase of 2000 in the years subsequent to Drake's publication; but the annual average number of deaths had decreased nearly 45 annually, and the births now exceeded the deaths by 21 annually; the population living to one death annually having risen to 28·22.

Dr. White attributes this great improvement in 45 years (one-third fewer dying in the latter than in the former period) partly to the introduction of inoculation, and the improvements in medicine, and in the hygiene as well of infants as adults; partly to the local improvements in the city during the preceding years. "The streets," he says, "have been widened in many places by taking down a number of old houses built in such a manner as almost to meet at the upper stories, by which the sun and air were almost excluded from the streets and inferior apartments. They have also been new paved, additional drains made, and by the present method of conducting the rain from the houses, are become much drier and cleaner than formerly. The erection of the locks, about four miles below the city, has been a great advantage to it, for before this the river was frequently very low, leaving quantities of sludge and dirt in the very heart of the city, also the filth of the common sewers, which it was unable to wash away."—*Phil. Trans.* vol. lxxii.

The subjoined table presents a view of the gradual and steady improvement in the sanatory condition of the city from the time of Drake to the years 1826—1831, when it appears to have retrograded. It is remarkable, however, that the average age has varied so little. The deaths in 1781 were 1 in 28, and average age at death 28 years; in 1839—41, the annual proportion of deaths had fallen to 1 in 37, and the mean duration of life risen to 32 years. The health of the city appears much more deteriorated in 1841 than it really was; that year was an epidemic year. The period for which the mortality was calculated is shorter, and the mode in which the previous results were obtained, an average of five years being taken as the mortality of the fifth, would necessarily render them rather more favourable than they really were.

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TABLE 16.

Showing the progressive improvement in the Health of York since the commencement of the last Century.

Period.	Number of Deaths.	Population.	Per Centage of Persons Dying *under* 5 Years of Age.	Per Centage of Persons Dying *above* 5 Years.	Per Centage of Persons Buried aged above 70	Average Age of Persons Buried.	Inhabitants to one Death.
*a*1728 to 1785	3,486	10,800	..	..	..	..	21·77
*b*1770 to 1781	..	12,798	38·6	61·3	16·5	28·34	28·22
1781 to 1791	4,388	14,079	37·92	62·08	14·67	30·52	32·08
1791 to 1801	4,991	16,145	37·13	62·87	14·44	30·64	32·33
1801 to 1806	2,538	17,181	35·83	64·17	13·54	29·36	33·84
1806 to 1811	2,592	18,217	37·30	62·70	15·55	30·90	35·72
1811 to 1816	2,395	19,502	33·84	66·16	17·71	30·47	40·70
1816 to 1821	2,557	20,787	35·88	64·12	16·62	31·4	40·56
1821 to 1826	2,643	23,523	36·23	63·77	15·82	32·56	44·51
1826 to 1831	3,033	26,260	36·87	63·13	13·04	29·39	43·30
1839 to 1841	2,398	30,152	42·16	57·84	..	32·21	37·77

⁂ The average annual mortality of each of the periods in this table is considered as representing the mortality of the last year of the period, on the population of which the ratio of persons living, to one death annually, is calculated. The percentages are from 26,000 deaths in the parish registers.

a. This estimate is on data from Drake's "History of York."

b. From data published by Dr. White, of York, in the 72nd volume of the "Philosophical Transactions."

On comparing the mortality of the several parishes in York (*vide* Tables 7, 8, App.), as deduced from the entries in the parish registers from 1778 to 1831, we find that their sanatory condition during that period was generally analogous to their present. The two parishes on the high ground on the south-west bank of the river are at the top of the list; the two lying close to the margin of the river are at the bottom. The following table will show this more clearly; and also that while in the former the sanatory condition has improved, in the latter it has remained stationary or deteriorated:—

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TABLE 17.

Showing the Mortality in Two High and Two Low Parishes for the periods extending from 1778 to 1831, 1791 to 1801, and for the Three Years 1839 to 1841.

		Per Cent. Dying Aged under 5 Years.	Mean Age at Death.
Holy Trinity, Micklegate; mean altitude 45 feet.	From 1778 to 1831	27·89	33·86
	1791 to 1801	28·04	32·96
	1839 to 1841	17·39	42·58
St. Martin cum Gregory; mean altitude 34 feet.	From 1777 to 1831	27·89	34·18
	1791 to 1801	33·60	34·90
	1839 to 1841	31·16	41·68
All Saints, North-street; mean altitude 23 feet.	From 1778 to 1831	47·12	25·30
	1791 to 1801	44·00	29·00
	1839 to 1841	55·10	19·56
St. John, Micklegate; mean altitude 17 feet.	From 1778 to 1831	49·17	22·74
	1791 to 1801	55·90	20·30
	1839 to 1841	54·45	22·67

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Although the data derived from the parish registers are not to be relied on so certainly as those from the modern registers, the results are so constant as to leave little doubt of their general accuracy. In some of the other parishes where a similar uniformity of sanatory condition has not been observed, it would appear that the deterioration or improvement is attributable to the increased or diminished density of the population. One or two parishes, formerly in a great degree suburban, contain now an increased civic population; while in others, in the heart of the city, old buildings have been taken down, the streets widened, and the population diminished. The following tables will illustrate these views:—

TABLE 18.

RATE of MORTALITY at Three Periods in Two Parishes, with a Decreasing Population.

Ancient City Parishes.	Population in Census Year.	Per Cent. dying aged under 5 Years.	Mean Age at Death.
Parish of St. Helen, Stonegate			
From 1816 to 1821.	678	51·7	23·4
1826 to 1831.	707	41·9	18·7
1839 to 1841.	607	23·8	39·9
Parish of St. Michael, Spurriergate.			
From 1816 to 1821	593	39·8	28·8
1826 to 1831.	645	46·1	22·1
1839 to 1841.	499	37·03	33·3

These results, however, being derived from the parish registers, must be considered as approximative only; as also those in the following table:—

TABLE 19.

RATE of MORTALITY at Three Periods in Two Parishes, with an Increasing Population.

Parishes in part Suburban.	Population in Census Year.	Per Cent. dying aged under 5 Years.	Mean Age at Death.
Parish of St. Saviour.			
From 1816 to 1821.	1172	29·6	35·4
1826 to 1831.	1348	35·4	28·2
1839 to 1841.	2028	53·0	25·2
Parish of St. Cuthbert.			
From 1816 to 1821.	824	35·8	34·1
1826 to 1831.	1797	40·2	30·1
1839 to 1841.	1995	53·6	28·8

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With regard to the second mode of comparing the past and present salubrity of York, it is probable that the mortality from the exanthematous epidemics, if it could be ascertained from the parish registers (as I think it might be), would correspond with the general mortality. The pestilential epidemics certainly have this correspondence. The last of this kind from which York suffered was the cholera; and the localities of 145 deaths from that disease out of 185 which occurred in the whole city show that it was fatal to the people in proportion to the deficient drainage of their locality. I add a historical sketch of the epidemics of York, commencing with those of the middle ages. From this it is manifest that the frightful mortality of these plagues and "visitations," as they were termed, was altogether dependent on the malaria generated in the city, partly from absolute uncleanliness, partly from deficient sewerage and drainage. It also shows that the seasons of prevalence and the localities of previous epidemics (the plague in 1551, the plague of 1604, and the cholera of 1832) are, to a great extent, identical with those in which they still flourish in a mitigated form, although the insalubrious localities now principally occupied by the poor were then the residences of the wealthier classes of society.

The means requisite to be adopted for improving the sanatory condition of the labouring classes in York are, I presume, sufficiently obvious from the details in the two Reports and the Appendix. A thorough, systematic, and provident application of the best medical and physical science to the architecture, drainage and sewerage, and the hydraulics generally of towns, would, without question, be the cheapest eventually, although possibly the most costly at the outset. As some of the causes of insalubrity remain yet to be ascertained, and as the registries of births and deaths must constitute the basis of all sanatory inquiries, it would be well to secure a more accurate entry of the cause of death by a systematic application of medical science to registration.

THOMAS LAYCOCK, M.D.

York, March, 1844.

APPENDIX.

A Sanatory Table for York; calculated on the Census of 1841, and the Entries of Deaths in the Registries of the York District during 1839, 1840, 1841.

Parish.	Population in 1841.	Mean Altitude.	Inhabitants per Rood.	Inhabitants to One Birth Annually.	Inhabitants to one Death Annually			Per Cent. living aged under 5 Years.	Per Cent. dying aged under 5 Years.	Average Age at Death, 1839-40-41.
					From all Causes.	From Epidemics.	From Pulmonary Diseases.			
Holy Trinity, Micklegate	1,212	61	24	84·75	52·69	404	281·8	9·04	17·39	42·58
St. Martin with St. Gregory	554	50	32	49·02	44·93	213	346·2	7·40	32·16	41·89
St. Helen, Stonegate	607	48	38	45·63	43·35	360	404·3	8·40	23·80	39·95
Holy Trinity, King's-court	685	53	43	38·92	47·80	171	207·5	9·05	34·88	38·07
St. Martin-le-Grand	553	44	30	50·27	48·83	332	184·3	7·23	26·47	37·18
Minster Yard	542	54	16	(*a*)	95·75	821	416·9	9·59	35·29	35·47
St. Giles (*d*)	1,258	48	31	43·37	39·81	358	147·2	10·60	29·63	35·30
St. Nicholas	182	..	19	45·5	54·65	(*e*)	606·6	7·18	20·08	34·30
St. Michael, Spurriergate	499	40	41	32·67	27·72	150	249·5	9·62	37·03	33·35
* St. Maurice (*f*)	1,424	40	22	36·37	42·72	356	178·0	13·11	33·00	32·54
St. Mary, Bishophill, Junior	1,757	48	35	39·39	37·38	210	125·5	12·85	31·91	31·51
St. John, Delpike	351	47	62	28·53	23·4	117	117·0	10·08	46·66	30·95
All Saints, Pavement	417	47	23	33·9	62·61	313	1390·0	10·09	40·00	30·30
St. Wilfrid and Mint Yard	356	50	13	44·59	75·96	357	593·3	6·46	35·55	30·18
St. Mary, Castlegate	952	36	42	34·69	30·49	286	151·1	11·02	47·29	29·69
St. Olave, Marygate (*g*)	563	46	39	19·68	28·93	175	154·3	12·09	45·83	29·35
St. Michael le Belfrey	1,218	54	32	35·07	37·00	143	287·9	9·37	43·87	28·27
* St. Lawrence	981	42	22	32·73	40·32	737	105·4	13·25	39·72	27·31
St. Sampson	761	52	38	43·23	53·10	254	253·6	10·77	46·51	27·09
St. Mary, Bishophill, Senior	1,123	40	31	34·44	41·05	196	153·8	12·91	40·24	26·61
* All Saints, Peaseholm	373	34	33	(*b*)	48·66	225	286·1	14·20	47·82	26·47
* St. Margaret	1,207	37	50	25·68	27·62	125	165·3	13·58	47·69	25·94
St. Peter the Little	573	47	70	28·65	44·07	172	286·5	11·69	43·59	25·28
* Beddern	368	48	59	*a*29·13	27·06	110	102·2	12·22	52·50	24·12
* St. Andrew	318	44	33	43·56	28·95	318	96·0	8·80	44·11	24·00
Holy Trinity, Goodramgate	551	52	46	28·11	44·59	275	183·6	15·24	45·94	23·89
* St. Saviour	1,995	39	50	29·51	37·22	142	231·9	13·95	57·87	23·62
* St. Crux	910	43	38	57·38	45·5	227	211·6	10·10	45·0	23·26
St. John, Micklegate	1,026	33	131	29·31	30·78	114	132·2	11·98	50·45	22·87
* St. Cuthbert	1,138	36	40	25·06	25·67	103	120·1	14·70	57·94	22·47
* St. Dennis	1,314	35	38	32·57	36·18	172	146·0	12·25	52·29	21·36
* St. Helen-on-the-Walls	444	40	135	(*b*)	66·66	334	740·0	14·18	57·89	19·52
All Saints, North-street	1,199	39	43	24·82	36·40	100	164·2	14·76	55·10	19·56
* St. Peter-le-Willows	497	39	40	27·89	27·61	93	115·5	16·70	59·25	19·9
* St. George	1,024	37	40	(*c*)	38·88	140	147·7	15·13	60·67	18·07
Total and Averages	28,932	44	37	33·87	37·77	187	181·	11·76	42·16	32·21

(*a*) Minster Yard and Beddern, (*b*) All Saints Peaseholm, St. Cuthbert, and St. Helen-on-the-Walls, and (*c*) St. Dennis and St. George are respectively united. No return of the births in the parish of St. George could be obtained.

(*d*) Exclusive of the asylum. (*e*) No deaths of this class. (*f*) Exclusive of the hospital.

(*g*) Exclusive of the workhouse.

Note.—The parishes which are marked * have a declination exclusively to the Foss; and as the level of that river is 7 feet higher than the Ouse, their true drainage altitude = the mean altitude − 7; thus the true drainage altitude of St. George is 30, or 37−7.

TABLE showing the Distribution of the Sick attended by the Medical Officers of the York Dispensary in 1839, 1840, 1841, 1842, and 1843, and by the Medical Officers of the Union in 1843; marking the Districts with a dense and poor Population, and deficient Drainage.

	Population.	Number attended		Diseases.					Per Centage of all Diseases to the Population.	Per Centage of			Deaths from Cholera in York, 1832.
				Epidemic & Endemic		Sporadic.							
		Under 5.	Above 5, and not stated.	Fever, Diarrhœa, and Dysentery.	Others of this Class.	Diseases of the Chest.	Acute Diseases.	Chronic Diseases.		Fever, &c.	Other Epidemics.	Diseases of Chest.	
No. 1.—New streets and courts partially or wholly unpaved or undrained.													
Attended by the Dispensary, 1839, 1840, 1841, 1842, and 1843	4,206	78	1,125	153	69	223	114	644	·286	·036	·016	·053	8
Attended by the Medical Officers of the Union, 1843		2	14	..	..	..	7	9	·003	..	..	..	..
No. 2.—Old streets and courts partially paved and only partially drained, not adjoining the river.													
(a) Attended by the Dispensary	3,537	102	1,020	129	106	242	137	508	·317	·036	·029	·068	22
(a) Attended by the Medical Officers of the Union		6	49	5	5	3	10	32	·015	..	..	..	..
(b) Attended by the Dispensary	2,028	74	844	121	56	206	89	446	·452	·054	·022	·101	12
(b) Attended by the Medical Officers of the Union		11	108	10	2	20	12	75	·053	..	..	..	..
No. 3.—Streets defectively drained, and adjoining the river Ouse.													
(a) Attended by the Dispensary	1,116	53	350	52	41	78	57	175	·361	·046	·036	·069	18
(a) Attended by the Medical Officers of the Union		4	51	..	..	..	20	35	·049	..	..	..	..
(b) Attended by the Dispensary	1,475	59	509	84	34	107	58	285	·385	·056	·023	·072	6
(b) Attended by the Medical Officers of the Union		..	24	..	..	..	6	18	·017	...	..	..	..
(c) Attended by the Dispensary	1,104	45	415	57	29	80	50	244	·417	·051	·026	·072	19
(c) Attended by the Medical Officers of the Union		3	12	4	..	1	1	9	·013	..	..	..	..
(d) Attended by the Dispensary	522	30	199	34	17	51	26	101	·438	·065	·032	·097	12
(d) Attended by the Medical Officers of the Union		4	22	7	..	5	1	13	·049	..	..	..	..
No. 4.—Streets defectively drained, and adjoining the west bank of the river Foss.													
Attended by the Dispensary	2,934	131	1,281	269	112	259	135	637	·481	·091	·038	·088	22
Attended by the Medical Officers of the Union		13	97	1	23	..	46	40	·0402	..	..	..	..
No. 5.—Walmgate and its yards, on the east side of the Foss.													
Attended by the Dispensary	3,905	125	1,371	286	82	336	97	695	·383	·073	·02	·085	15
Attended by the Medical Officers of the Union		24	150	..	25	..	96	53	·044	..	..	..	..
No. 6.—The streets not named, generally well drained and paved.													
Attended by the Dispensary	6,603	53	792	102	44	133	73	493	·127	·015	·006	·02	11
Attended by the Medical Officers of the Union		..	18	..	..	3	2	13	·002	..	..	..	..
Totals and averages	27,430	817	8,451						·338				145

No. 1 includes George-street, Longclose-lane, Hope-street, Ebenezer-place, Brunswick-place, Rosemary-place, Bishop-hill, St. Mary's-row, Clementhorp; Nunnery-lane, including Dove-street, Swann-street, and Queen street; Laverthorpe, Bilton-street, Redeness street, Lord-mayor's-walk, the Groves, Penley-street, Pilgrim-street, Clarence-street, Bootham, Bootham-row, and Bootham-square.—No. 2.—(*a*) The north east of cathedral, including Gillygate, Aldwark, St. Andrew-gate, Beddern, Ogleforth, Goodramgate, College-street, Peter-gate and Collier-gate.—(*b*) The south and south-west of cathedral, including Minster-yard, Grape-lane, Swinegate, Stonegate, Newgate, Jubber-gate, Coffee-yard, Shambles, Finkle-street, Church-street, and Davy-gate.—No. 3.—(*a*) Skelder-gate, its courts, &c., including Albion street, Fetter-lane, and Barker-lane.—(*b*) North-street, and Tanner-row, including Simpson's-row, Church-lane, Little Church-lane.—(*c*) The Water-lanes, Castle-gate, Friar-gate, Spurrier-gate, Copper-gate.—(*d*) Mary-gate.—No. 4.—Foss gate, Hun-gate, Garden-place, Stone bow-lane, Green-lane, Palmer-lane, Wesley-place, Lowther-street, Hiram-place, Haver-lane, Dundas-street, Peasholm-green, St. Cuthbert, Barker-hill, Haymarket, St. Saviour.

TABLE showing the Mortality at Different Ages, and Average age at Death, in the several Parishes of the City of York, from 1780 to 1840, Calculated at Two Decennial and Eight Quinquennial Periods.

Name of Parish.	Per Centage of Burials of Persons under 5 Years of Age.								Per Centage of Burials of Persons above 5 Years of Age.							
	1781 to 1791	1791 to 1801	1801 to 1806	1806 to 1811	1811 to 1816	1816 to 1821	1821 to 1826	1826 to 1831	1781 to 1791	1791 to 1801	1801 to 1806	1806 to 1811	1811 to 1816	1816 to 1821	1821 to 1826	1826 to 1831
St. Saviour	37·0	23·5	40·5	38·2	28·0	29·6	32·8	35·4	63·0	76·5	59·5	61·8	72·0	70·4	67·2	64·6
St. Cuthbert	41·8	35·2	34·1	36·1	30·4	35·8	33·6	40·2	58·2	64·8	65·9	63·9	69·6	64·2	66·4	59·8
St. Maurice	..	..	35·8	41·0	25·3	38·1	32·0	42·6	..	..	64·2	59·0	74·7	61·9	68·0	57·4
Trinity, Goodramgate	..	..	36·2	41·2	38·7	43·3	48·5	41·5	..	..	63·8	58·8	61·3	56·7	51·5	58·7
St. Michael le Belfrey	39·2	37·0	37·3	36·1	37·0	34·2	36·4	38·5	60·8	63·0	62·7	63·9	63·0	65·8	63·6	61·5
St. Olave*	25·3	24·3	14·6	14·7	17·8	27·8	28·6	23·3	74·7	75·7	85·4	85·3	82·2	72·2	71·4	76·7
St. Martin, Coney-street	50·0	49·1	11·6	24·4	30·0	26·0	27·5	22·5	50·0	50·9	88·4	75·6	70·0	74·0	72·0	77·5
Trinity, King's-court	..	..	..	..	..	23·5	48·5	52·9	..	..	..	..	..	76·5	51·5	47·1
St. Sampson	41·0	64·3	63·3	38·4	36·9	32·8	36·2	39·8	59·0	35·7	36·7	61·6	63·1	67·2	63·8	60·2
St. Helen	41·1	67·0	51·0	38·6	40·0	51·7	34·2	41·9	58·9	33·0	49·0	61·4	60·0	48·3	65·8	58·1
All Saints', Pavement	40·1	43·4	43·8	46·6	40·6	39·5	38·8	41·8	59·9	56·6	56·2	53·4	59·4	60·5	61·2	58·2
All Saints', North-street	47·1	44·0	49·2	49·0	48·2	46·3	54·9	38·3	52·9	56·0	50·8	51·0	51·8	53·7	45·1	61·7
St. John	49·3	55·9	47·7	48·5	50·7	51·0	45·2	45·1	50·7	44·1	52·3	51·5	49·3	49·0	54·8	54·9
St. Michael, Spurriergate	43·8	44·9	58·9	38·8	45·0	39·8	31·4	46·1	56·2	55·1	41·1	61·2	55·0	61·2	68·6	53·9
St. Mary, Castlegate	37·0	37·4	43·3	41·3	39·5	45·5	31·2	33·3	63·0	62·6	56·7	58·7	60·5	54·5	68·8	66·6
St. Dennis	42·5	37·6	37·1	52·8	45·8	36·6	38·5	48·5	57·5	62·9	62·9	47·2	54·2	63·4	61·5	51·5
St. Crux	36·6	32·6	38·0	34·4	34·0	35·6	47·3	44·2	63·4	67·4	62·0	65·6	66·0	64·4	52·7	55·8
St. Margaret	46·1	48·3	35·7	59·0	37·0	33·9	49·7	47·2	53·9	51·7	64·3	41·0	63·0	66·1	50·3	52·8
St. Lawrence	35·6	33·0	26·8	35·8	40·2	37·7	31·0	33·0	64·4	67·0	73·2	64·2	59·8	62·3	69·0	77·0
Bishophill, Junior	32·6	30·2	30·0	24·2	25·3	36·1	30·9	37·0	67·4	69·8	70·0	75·8	74·7	63·9	69·1	63·0
Bishophill, Senior	38·6	35·0	28·8	41·4	33·9	33·3	31·0	38·0	61·4	65·0	71·2	58·6	66·1	66·7	69·0	62·0
Trinity, Micklegate	30·6	28·04	36·6	34·4	20·8	30·5	28·8	13·4	69·4	71·96	63·4	65·6	79·2	69·5	71·2	86.6
St. Martin cum Gregory	29·5	33·6	21·8	22·0	44·1	27·1	26·8	22·0	70·5	66·4	78·2	78·0	55·9	72·9	63·2	78·0

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* This parish contains the County Asylum, City Workhouse, and one or two hospitals for aged persons.

N.B.—The grave-yards of some of these parishes being small and in-sufficient (*vide* App. No. 13), the numbers interred in them do not correspond with the numbers dying in the parish; and as there was no other parochial place of interment previously to 1836, except the Friends' Burying-ground, other grave-yards must have received the dead from the parishes in question.

TABLE showing the Mortality at Different Ages, and Average Age at Death, in the several Parishes of the City of York—*continued.*

NAME OF PARISH.	Per Centage of Burials of Persons above 70 Years of Age.								Average Age at Death of Persons Buried.							
	1781 to 1791	1791 to 1801	1801 to 1806	1806 to 1811	1811 to 1816	1816 to 1821	1821 to 1826	1826 to 1831	1781 to 1791	1791 to 1801	1801 to 1806	1806 to 1811	1811 to 1816	1816 to 1821	1821 to 1826	1826 to 1831
St. Saviour	19·0	12·0	14·0	14·0	18·5	15·6	13·7	18·6	30·3	33·4	26·7	30·7	34·0	35·4	30·2	28·2
St. Cuthbert	12·4	12·6	18·0	14·2	14·4	19·7	13·0	19·5	29·9	32·6	32·4	30·9	32·2	34·1	30·6	30·1
St. Maurice	..	..	14·4	13·0	14·0	22·6	26·6	20·9	..	..	23·7	29·2	34·4	35·0	37·5	30·9
Trinity, Goodramgate .	..	..	16·0	12·7	17·8	12·5	6·4	17·0	..	..	20·3	29·1	29·0	27·4	23·8	30·7
St. Michael-le-Belfry .	12·25	18·0	12·6	13·0	22·2	15·7	14·4	11·4	29·1	30·9	29·2	30·8	32·2	31·9	29·6	29·0
St. Olave*.	22·0	23·0	17·8	19·1	24·5	20·7	22·7	24·0	38·5	39·1	41·5	41·7	44·6	37·9	38·5	42·7
St. Martin, Coney-street .	15·0	13·9	14·0	19·5	15·0	13·0	11·8	22·5	27·1	29·6	38·7	38·7	29·0	28·7	32·8	43·2
Trinity, King's-court . .	..	..	..	..	..	14·1	18·1	11·7	..	..	..	..	..	42·2	29·2	18·7
St. Sampson	12·0	13·1	13·8	16·4	18·5	13·3	12·7	12·2	27·4	25·7	24·9	32·2	29·0	33·2	31·2	29·5
St. Helen	8·6	16·5	9·4	16·0	13·3	13·8	10·5	3·2	24·1	30·9	26·8	32·9	24·2	23·4	21·9	18·7
All Saints', Pavement .	10·9	14·5	9·6	12·6	12·0	10·4	14·8	9·3	30·1	26·9	26·8	24·3	31·1	29·4	29·2	26·2
All Saints', North-street.	14·8	11·2	7·7	8·8	9·4	11·1	10·9	14·2	25·2	29·0	22·2	21·7	24·1	24·9	21·6	28·4
St. John	10·2	6·6	10·2	16·6	2·8	11·0	7·1	7·8	22·6	20·3	22·8	26·2	17·7	24·2	24·5	22·9
St. Michael, Spurriergate	11·0	11·3	3·5	17·9	12·2	13·9	14·2	11·5	26·0	26·1	19·7	34·4	14·9	28·8	37·2	22·1
St. Mary, Castlegate . .	15·8	7·7	13·4	14·0	20·4	11·2	12·7	12·1	30·3	27·6	32·1	27·1	31·9	26·1	33·6	31·3
St. Dennis.	12·4	11·8	14·1	12·0	11·0	12·4	20·0	9·5	29·1	28·0	31·4	28·8	26·2	27·6	34·3	22·9
St. Crux	15·5	23·7	12·7	24·6	21·0	20·5	13·1	8·1	30·3	36·9	30·5	37·6	36·2	35·3	25·4	25·5
St. Margaret	9·7	13·3	8·0	12·6	11·7	15·6	11·8	13·4	..	27·1	29·8	24·1	30·7	27·2	23·5	26·6
St. Lawrence	16·1	15·3	8·6	15·5	17·0	17·9	9·6	15·4	30·7	25·6	29·7	32·0	30·3	31·5	31·8	28·5
Bishophill, Junior . .	14·3	14·8	17·5	15·5	24·0	10·3	20·6	15·7	33·2	31·4	35·4	36·9	39·9	26·9	34·1	30·3
Bishophill, Senior . .	14·9	19·4	18·7	15·9	16·4	24·0	16·6	15·5	31·5	35·4	37·6	29·3	32·9	35·4	31·3	29·5
Trinity, Micklegate . .	17·2	13·3	22·1	24·7	23·3	30·5	23·4	23·1	32·8	32·9	34·8	24·0	37·7	33·9	39·2	38·2
St. Martin cum Gregory.	19·6	17·7	14·5	22·0	9·3	28·8	22·6	25·9	42·2	34·0	39·2	40·4	28·7	41·5	47·9	42·4

* This parish contains the County Asylum, City Workhouse, and one or two hospitals for aged persons.

N.B.—The grave-yards of some of these parishes being small and insufficient (*vide* App. No. 13), the numbers interred in them do not correspond with the numbers dying in the parish; and as there was no other parochial place of interment previously to 1836, except the Friends' Burying-Ground, other grave-yards must have received the dead from the parishes in question.

TABLE showing the Average Age at Death, and Per Centages at Three Ages Ages of all the Persons Buried in each Parish of the City of York (whose are entered in the Registers) between 1770 and 1831.

——	Number whose Ages are Registered.	Average Age at Death.	Per Cent. Dying aged under 5 Years.	Per Cent. Dying aged above 5 Years.	Per Cent. Dying aged above 70 Years.	Years above or below the Average at Death in the whole City.
For the whole of the city	26,045	30·80	36·44	63·56	15·00	. .
a St. Olave	3,233	40·42	22·05	77·95	21·72	+9·62
St. Martin cum Gregory	623	34·18	28·36	71·64	20·05	+3·38
Holy Trinity, Micklegate	1,280	33·86	27·89	72·11	22·20	+3·06
St. Martin, Coney-street	400	33·65	30·14	69·86	15·59	+2·85
Mary Bishophill, Junior	946	33·20	30·29	69·21	16·59	+2·40
St. Crux	711	32·96	37·84	62·16	17·40	+2·16
Mary Bishophill, Senior	1,271	32·67	35·00	65·00	17·67	+1·87
St. Cuthbert	1,405	31·61	35·90	64·10	15·41	+0·81
b St. Maurice	652	30·18	35·90	64·10	18·58	—0·62
St. Saviour	1,229	31·37	33·12	66·88	15·68	+0·57
Trinity, King's Court	101	30·14	41·63	58·37	23·63	—0·66
St. Lawrence	987	29·59	34·14	65·86	14·42	—1·21
St. Michael-le-Belfrey	1,828	29·41	36·96	63·04	14·94	—1·39
St. Mary, Castlegate	1,614	29·28	31·56	61·44	13·41	—1·52
St. Sampson	1,883	28·41	44·10	55·90	14·00	—2·39
St. Dennis	1,294	28·30	42·36	57·64	12·90	—2·50
All Saints', Pavement	1,197	27·91	41·82	58·18	11·76	—2·89
Trinity Goodramgate	799	26·70	41·53	58·47	12·73	—4·10
St. Margaret	1,250	26·70	44·61	55·39	12·01	—4·10
St. Helen	539	25·44	45·69	54·31	11·41	—4·36
St. Michael, Spurriergate	909	25·83	43·59	56·41	11·94	—4·97
All Saints', North-street	889	25·30	47·12	52·88	11·01	—5·50
St. John	1,005	22·74	49·17	50·83	9·04	—8·06

⁂ The names are given as the average age is above or below the mean age of the whole city.

a. With the deaths from the County Asylum, the city workhouse, and a hospital for decayed gentlewomen.

b. The deaths in the County Hospital, situate in this parish, are not included.

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Report on the Epidemics of York, especially those prevalent in the 16th, 17th, and 18th Centuries, and on their connection with deficient Sanatory Regulations. *By* T. Laycock, M.D., *Physician to the York Dispensary.*

During the middle ages, the towns and large cities of Europe were ravaged, at intervals, by destructive epidemics. The history of these "visitations," is of very great political importance, as I shall show subsequently, and I have therefore thought it would be proper to place on record some facts respecting them, and their prevalence in York, which have not hitherto been noticed.

The first notice I have met with is in connection with the "black death," a glandular typhus or plague, by which it is calculated 25,000,000 of persons perished in Europe only, during the years 1348 and 1349. In the latter year, according to Dr. Barnes, the historian of Edward the Third's reign, "in the City of York it raged furiously from about the Ascension, to the Feast of St. James the Apostle," that is to say from April to the end of July. As in London, so in York, the common grave-yards were insufficient for the interment of the dead. On the 10th July, 1349, a Commission was granted to the Bishop of Damascus to dedicate the chapel of St. Olave at Fulford, and the cemetery thereof, which is dependent on the church of St. Mary, York, "in regard ecclesiastical sepulture had ceased therein, by reason of a pestilence and great mortality had then reigned."* Mr. Thiselton, Registrar to the Dean and Chapter, has favoured me with a perusal of a manuscript copy of "Some Memoirs out of the Ecclesiastical Registers of York," in which there is the following entry:—"1368. The Chancellor, pres., John York to the school, though not Master of Art, such being scarce by the late mortality, Jan. 9." The black death "left scarcely a priest alive," but this entry is at too late a period to be referred to that destructive plague. A "great plague," however, broke out in London in 1363, and since the provinces rarely escaped, when the metropolis suffered, York and the North of England may have experienced unusual mortality at this date. Again, in 1379, according to Gent, "so great a mortality happened in the north, that encouraged the Scots to come into England, killing the sick, and driving the healthful into the southern parts." This is doubtful, but during the prevalence of the "black death," the Scots certainly made a foray into England, taking advantage of the weak condition of the population, and carried the disease back with them. Again, in 1390, the North of England suffered from a pestilence, in common with the whole kingdom, and Gent says that 11,000

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* From the records of the York Ecclesiastical Court, quoted in Collectio Rerum Eccles., by G. Lawton, Esq., vol. i. p. 44.

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persons were buried in York in that year; an incredible number, as it must have been much more than one-half of the population. The "sweating sickness," an epidemic resembling the cholera in all its most essential features, the only difference being, that in the one the skin, in the other the bowels were affected,* appeared first in England in August 1485, being imported, according to Hecker and preceding historians, by the Earl of Richmond's invading army. It is doubtful *à priori*, however, whether the "sweating sickness" was really a new disease, and imported as stated. Indeed, Hollingshed distinctly observes, that in the year 1252, "*sweats*, agues, and other diseases," prevailed in England after a dearth; a murrain among cattle following them in autumn. It is not a little remarkable, too, that in June of this year, a pestilential disease was prevalent in York, as appears from the following entry in the corporation records:—

> "$\mathrm{M_d}$. that the fift day of Juyn, in the secund yere of the reigne of King Ric. the Third......cam in p'per p'sone before Nicholas Lancastre, mayre, and shewed how oone Robt Hewarth of York, shomaker, unto whome the said......, stode apprentise, licensed hyme for fere of the plage of pestilence that reigned to dep^t frome his s'vice unto his p'per frends, and that he the said...... suld wele and truly come agane to his s'vice unto the said Robt Heworth, assone as it shall pleas o^r lord Jhu to sease the said plage, the forsaid......made a bodily othe upon tholy Evangelist before the said maire, desiring his lordship to testifie the same."†

Mr. Davies seems to incline to the opinion that this plague, then in York, was the disease alluded to. He observes in a note,—

> "From this memorandum we learn that a pestilential sickness, of so serious a nature as to be called the plague, was raging at York early in the year 1485. It is recorded in Arnold's Chronicle (p. 38), that there was 'this yere a grete deth and hasty, callyd th' swetynge syknes,' which proved fatal to two successive Lord Mayors, and several Aldermen of London, within a few days, during the month of September. On the 16th of August, when the York council were assembled upon receiving information of the Earl of Richmond's landing, no more than three aldermen, and seven of the twenty-four were present; and it is noticed, that the others were sojourning without the city, 'for the plage that reigneth.' By the alarming spread of this pestilence, the coronation of Henry VII. was delayed until the 30th of October." (Pol. Verg. 567.)‡

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* In this disease, the sweat ran from the patient through the bed-clothes in a stinking stream; the voice was weak and tremulous, respiration difficult, the heart palpitated violently. The hands and feet turned blue, the nails were curved, and the skin wrinkled. The mind was rarely affected. It was as rapidly fatal as the cholera. "Some in one hour," writes Kaye, "many in two it destroyed, and at the longest, to them that merilye dined, it gave a sorrowful supper. As it founde them so it toke them, some in sleape, some in wake, some in mirthe, some in care, some fasting and some ful, some busy and some idle, and in one house sometyme three, sometyme fine, somtime seuen, sometime eyght, sometyme more, sometyme all, of the which, if the haufe in euery towne escaped, it was thoughte great fauour."

† Extract from the Municipal Records of the City of York, by Robert Davies, F.S.A., 8vo. 1843, p. 213.

‡ Ibid. p. 213.

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It certainly seems probable that the disease observed in the army at Bosworth, in the beginning of August, was the same as that prevailing at the same time in York. This would be amost interesting point to ascertain, which might be done by reference to contemporary records. The next "visitation" of the sweating sickness occurred, according to all historians, in 1506; but there is undoubted proof that the disease was prevailing in York in 1493, as the following extract from the manuscript "Memoirs," before quoted shows. "1493, William Beverley died, but his residence approved, though he had kept in two days of the sweating sickness. Jan. 4."

With the exception that Archbishop Rotherham died of the plague at Cawood, in 1500, caught probably at York, we find no record of an epidemic, until 1550. In that and the following year, it appears, both from the parochial register of St. Martin cum Gregory (the only one of that date in existence), and from the municipal records, that a contagious disease was exceedingly destructive in York, and created great alarm. I am indebted to Mr. Davies, the town clerk of York, for the following documents, which, as well as the statistical data from the parish register alluded to, are certainly unique. The first appears to have been preparatory:—

"xvj die Februarij, Anno iiij^{to} R.R. Edw. vj^{ti}.

"John Lewes, Mayer,

"Assemblyed in the counsaill Chambre of Ousebryg, when & where the sayd presens dyd tayke one ordre as well for the relief of all suche persons as are visyted with the playg of pestylens in any place within this city and suburbes of the same, as also for the relief, help, & succour of all indigent and poore people, and especially suche as are impotent & not habyll to laybour."

From the following we may conclude that in May the disease had created more serious alarm, and was increasing in virulence.

"vij die Maij anno iiij^{to} R.R. Edw. vj^{ti}.

"It was agreyd that all wardens in ther wardes shall generally take shuche ordre for savegard of this citie, that all those whiche be, or herafter shalbe, infectyd with the plaige, shall kepe their owen howses, and to be preparyed for accordynglie. And if it forton any of them uppon great necessite to go abrode, then such as dothe goo abrode, shall have a white Rodd in ther hands thentent they may be knowen; and that every howse that is infectyd shall have Rede Crosse sat uppon the Dower; and also that suche as departith uppon the plaige shall be buryed uppon the day, and not uppon the nyght; and further, when any person is departyd, that ymmediatlie before the corse shalbe hadd to the buryall, the bell shalbe knylled unto the corse be burried; and further, that no Dogges go abrode in this citie uppon payn to forfait for every dogg that goith abrode vj^{s}. viij^{d}."

The mortality in the parish of St. Martin cum Gregory, for that year, seems uncertain. The entries in the register number 5 in July, 21 in August, 25 in September, 6 in October, 4 in November, and 6 in December. The average annual number of burials in the parish, for the eight or nine preceding years,

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was 5·43; so that the mortality, during the summer months only, had increased more than twelvefold; and as the population, estimated on the births and burials of previous years, would not be more than 212, about one in three died. The disease abated as winter advanced, for on the 12th January, 1551, the Lord Mayor wrote to the Lord President, stating that since Christmas not more than six persons had died of the plague in all the city and suburbs, and at that time there was not one sick in all the city.

The respite, however, was but temporary, as the disease reappeared with summer weather; and in June the authorities are again compelled to interfere:—

> " xxvj^{to}. die Junij, A$_{o}$. R.R. Edw. vj$_{ti}$ quinto.
>
> "For soo moche as the Sykenesse hath nowe latly renewed in some parts of this citie, and specially of the Weast side of Ouse, and is feared to encrease onlesse bettar ordre be not herin had. It is therefore ordered," &c.
>
> [To the same effect as to keeping house, and marking the houses with a red cross, as in the former order.]

This document is remarkable, as pointing to the locality of the disease, "the west side of the Ouse." The united parish of St. Martin cum Gregory is situate on that side, and again suffered severely, but not apparently at the date of the document just quoted; for there are no entries in the register of burials until September, in which month 5 are entered; then 20 in October, 14 in November, 1 in December. If the population of the parish be calculated at the same number as in the preceding year, namely, 212, the deaths are 1 in 4, and are again increased tenfold. From the entries we may infer that in June, July, and August few deaths had occurred in this parish, and we must look elsewhere for the *habitat* of the epidemic on " the west side of the Ouse." Now the two parishes of St. Martin and St. Gregory are situate on the declivity trending towards the river, the parishes of All Saints, North-street, and St. John, Micklegate, and part of Bishophill Junior being between them and the river itself. It is to these parishes, and especially the two last, as being nearest the west side of the Ouse, that we must infer the Lord Mayor alluded in his order of the 26th June. This being granted, we can easily see how in due course St. Martin cum Gregory would become infected in September and October. It should be added, however, that the entire absence of entries in June, July, or August, could scarcely depend on the circumstance that there were no deaths in those months. Above one-half of the estimated population of this parish was carried off in the two summers of 1550 and 1551; and as it was then, as now, one of the healthy parishes of York, the births annually exceeding the deaths by nearly

37 per cent., we cannot fairly estimate the deaths in the city generally from this epidemic at less than 1 in 2, or one half, but most probably the mortality was greater.

It is singular that, just as in 1485, the year in which historians assert the sweating sickness first appeared in England, York was infected with a plague, so in this its last recorded appearance in England, we find York again ravaged by an epidemic. Whether this was the true sweating sickness does not appear, but it is more than probable that it was.

The sanatory regulations of the day are curious. Above thirty years after their date, we find it is ordered in London by the Lord Mayor, that a red cross and "Lord have mercy upon us," be posted on all the houses infected with the plague, and persons going abroad from infected houses were required to carry a white rod in their hands, "two feet long." The red cross had an early reference to pestilences. In the "black death" of 1348, the flagellants, a sect of wandering ascetics, brought into existence by that terrible destroyer, wore red crosses upon their cloaks. Much light would no doubt be thrown upon the epidemics of this century by a diligent search in the valuable ecclesiastical records of our cathedral.

No further account of epidemical disease is met with from 1551 until 1604: "In this yeare," in the words of a city parish register, "was the greate plague in Yorke." But, in fact, what would now be esteemed a very high mortality was then little thought of, so numerous were the causes of disease and death during the middle ages. When the plague was absent, "the purples" (petechial fever), small-pox, autumnal cholera (termed "the plague in the guts"), and exanthematous typhus were constantly rife. But while these destroyed only 1 in 10 or 15 of the population, "a great plague," or "great visitation," destroyed 1 in 2, or 3 in 4; and this was the kind of epidemic that happened in York in 1604. In the previous year (1603) the disease was prevalent in London; it was in Pontefract in the autumn of the same year, and only very gradually approached York in the spring of the year following.

From the documents found in the city archives it appears that the efforts of the authorities were directed principally against the propagation of infection by mendicants and vagrants generally. Apparently, no measures were adopted to purify the city from miasmata; and as there were wide stagnant moats, no drainage, narrow streets, and filthy open channels, the tide flowing above the city, and at ebb leaving sludge and mud on the deep banks of the river, and exposing the mouths of the sewers, the results may readily be anticipated. The disease broke out, according to tradition, in "The Hag-worm's Nest," or Beedham's-court, on the west side of the river,

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corresponding to the habitat of the plague in 1551, and in a few months carried off 3512 persons. The registers for that year of 17 parishes are extant (that of St. Nicholas is in the Will-office), and from these I have been enabled to make out the table subjoined, the clergy generally having rendered me all the assistance in their power. It is to be regretted that the registers of six large parishes are wanting for that year. The probable population in each parish is calculated on the average births and deaths in the four or five preceding years; the estimate for the whole city would be about 11,000, a number very near that fixed by Mr. Rickman in the Census Abstracts of 1831. A century later it was not 12,000. The deaths, therefore, from this plague would be at least about 1 in 3. The first entry of death from the epidemic is on June 4th, in the register of St. Michael, Spurrier-gate. It is a singular coincidence, that while the cholera commenced in the "Hag-worm's Nest"—the traditional natal spot of the plague under consideration, and probably near to that of 1551—the first death from cholera took place also in the parish of St. Michael, Spurrier-gate, and on June 5th. The annexed drawing is of a street in this parish (First Water-lane) in which the cholera was most fatal, and in which the first death took place. The street is just wide enough for one cart to pass, and stands now as it probably stood in 1551 and 1604. June, indeed, appears to have been the epidemical month in York: on "June the fift," 1485, we find the apprentice of Robert Heworth was licensed by his master to leave York, "for fear of the plage of pestilence that reigned," and so with the other documents referring to 1550 and 1551. The first steps also of the plague seem to have been very similar to that of cholera, marking the badly drained districts by its course, as did the latter. The mortality attained its height in the several parishes of the city progressively, as will be seen by reference to the subjoined table of monthly deaths. The low-lying parishes, namely, St. John, Micklegate; St. Michael, Spurriergate; St. Mary, Castlegate; All Saints, Pavement, and All Saints, North-street, first suffered in the order mentioned. St. Mary, Bishophill Junior, adjoining Skeldergate, was ravaged concurrently with St. John, to which it is contiguous; and St. Martin cum Gregory concurrently with All Saints, North-street. Next in order were the parishes on the made ground between the two rivers, on the east bank of the river Foss, within the walls; then the eastern parishes; the outlying parishes suffering last.

TABLE 1.—STATISTICS of the Epidemic or Plague Year of 1604, in 17 Parishes of the City of York.

Name of Parish.	Population.		Annual Average Number of Deaths previously to 1604.	Actual Number of Deaths in 1604.	Number of Inhabitants to one Death.	Actual Rate of Increase of Mortality in 1604, above Average.	Monthly Deaths in 1604, in 17 Parishes.									Total Deaths.
	According to Census of 1841.	In 1604, calculated in the ratio of 1 birth to 22·4 1 death to 27.					January to April.	May.	June.	July.	August.	September.	October.	November.	December.	
St. Mary, Bishophill, Junior	1,747	252	10·4	110	2·29	10·58	..	8	10	36	18	15	9	8	5	110
St. John, Micklegate	1,004	437	15·0	103	4·24	6·20	4	..	14	29	34	20	2	..	..	103
St. Michael, Spurriergate	499	328?	11·0	107	3·07	9·73	10	2	3	23	43	20	2	2	2	107
St. Mary, Castlegate	932	312?	..	104	..	..	..	..	..	27	55	11	10	1	..	104
All Saints, Pavement	417	295	10·25	97	3·04	9·46	11	3	4	14	37	11	7	4	6	97
All Saints, North Street	1,199	280	12·25	85	3·29	6·94	3	3	3	4	23	32	7	7	3	85
St. Martin cum Gregory	554	265	10·00	62	4·27	8·60	..	..	..	4	21	23	8	6	..	62
St. Martin, Coney Street	553	183	5·25	88	2·08	14·29	..	..	..	12	23	31	10	8	4	88
St. Crux	910	374	13·00	142	2·63	11·00	..	11	..	23	63	38	6	..	1	142
St. Dennis	1,311	365	16·00	150	2·43	9·38	4	..	8	28	61	31	11	4	3	150
St. Margaret	1,704	429	16·50	168	2·55	10·24	2	..	2	15	74	46	16	9	4	168
St. Helen, Stonegate	607	260	10·25	109	2·43	10·44	4	2	..	1	24	51	18	7	2	109
Holy Trinity, Goodramgate	901	337	11·00	129	2·61	11·73	5	10	4	8	33	57	7	5	..	129
St. Saviour	2,359	..	12·25	118	..	9·63	..	..	..	to9	19	63	24	3	..	118
St. Michael-le-Belfrey	1,637	770	31·25	134	5·50	4·44	14	15	1	8	29	39	26	12	3	134
Holy Trinity, Micklegate	1,159	670	26·00	272	2·09	10·46	12	7	4	17	59	94	47	19	13	272
St. Nicholas, (without Walmgate)	182	80?	..	42	2·00	41·00	..	1	..	..	12	22	5	..	2	42

Following the practice of their ancestors, the citizens left the city, and encamped on Hob Moor and on the Horsefair. Communication with the country was cut off, and crosses erected, a mile or two from the city, on three or four of the principal roads, that markets might be held around them. This pestilence extended, however, into the rural districts. It was at Stamford Bridge during the same summer, and in the following at Northallerton, Darnton, &c., as may be gathered from the parochial registers of those places.

In considering the table, with reference to the mortality from this epidemic in the different localities of the city, and to the more modern mortality, various discrepancies occur. Holy Trinity, Micklegate, now, and doubtless then, one of the healthiest parishes, lost, *apparently*, one-half of its population; but as Hob Moor, where the citizens encamped, is situate in this parish, probably the number of burials was increased from this circumstance. On the other hand, St. John, Micklegate, now the worst parish in York, is one of the best in the table: the character of the population at the two periods will perhaps explain this. Many of the large houses now sub-let to poor families were then the residences of wealthy merchants, who would be able to remove their families at once into the country. But its sanatory condition, even then, was lower than that of the higher situate parish of St. Martin cum Gregory in 1550 (see *ante*); for during the four preceding years the burials in the parish exceeded the baptisms by above 22 per cent. The parish of St. Helen, Stonegate, was in a very low sanatory condition, the deaths during the plague year being 1 in 2·24, and the burials exceeding the baptisms in the four preceding years nearly 100 per cent. With respect to the other parishes (except St. Martin, Coney-street), their mortality corresponds generally with their present state, and shows very strikingly how permanent the causes of a low sanatory condition are.

If the mortality from cholera had been as great as from this epidemic, the deaths would have been about 9000 instead of 185. Indeed, it seems almost incredible that one-third (and even one-half) the population should have died; but this happened with the cholera in towns where filth and miasmata prevailed. It is manifest, from the repeated recurrence of the same name in the registers, that whole families were destroyed. In the register of St. Helen, Stonegate, the occupation or parentage of the deceased is stated, so that I am enabled to subjoin the deaths in a few families resident in that parish:—

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Tomlinson, joiner.

Son Thomas, buried	25	Sept.
Daughter Ann	26	,,
Wife	27	,,
Son John	30	,,

John Wilson, clocksmith.

Son William, buried	15	Aug.
Anthony Leonis (his 'prentice)	26	,,
John Wilson, the clocksmith	26	,,

Richard Cararte, "potticary."

Richard Cararte, "the potticary," buried	2	Sept.
Son Robert	7	,,
Son Christopher	16	,,
Daughter Elizabeth	18	,,
Wife Cicelly	4	Oct.

Nicholas Cripinge, haberdasher.

*Ann, his wife, buried	30	Aug.
Daughter Mary	6	Sept.
Nicholas Cripinge, the haberdasher	8	,,
Son Thomas	10	,,
Son Robert	17	,,

Wm. Porson, the goldsmith.

Daughter Joan, buried	21	Aug.
Son John	22	,,
Daughter Elina	23	,,
Son William	24	,,
Daughter Anne	1	Sept.
Wm. Porson, the goldsmith	7	,,

Ralfe Harveye, Imbrother.

Ralfe Harveye, Imbrother, buried	6	Oct.
Son Robert	3	Nov.
Daughter Elizabeth	4	,,
Wife Susanna	9	,,

It is evident that the wife, son, and daughter of the embroiderer were away when he died, probably gone to their friends in the country; and a month after, in the beginning of November, when the deaths had almost ceased in their parish, had ventured back to look after their property, took the infection, and died, like their neighbours, within a few days of each other.

The above details need no comment; simple as they are, they sufficiently exhibit the domestic distress and desolation caused not only by this epidemic, but also by those oft-recurring pestilences of the previous centuries. Drake says this was the last of the plagues by which York was periodically visited; meaning, probably, that it was the last of the "great plagues." We have no further record of the epidemics of York until his own time, when Dr. Clifton Wintringham published an account of the weather and epidemic diseases of York for the twenty years from 1715 to 1735, and when the deaths were about 1 to 22, and exceeded the births by nearly 20 per cent. annually. This essay is a very interesting document, and it is a fortunate circumstance that his son, Sir Clifton Wintringham, republished it with the other works of his father. Its title is "Commentarius Nosologicus, Morbos Epidemicos et Aëris Variationes in Urbe Eboracensi Locisque Vicinis, per viginti Annos grassantes complectens. Editio tertia," (first published in 1739).

From this essay it appears that York suffered constantly either from one epidemic or another. Small-pox appeared at three or four intervals during the 20 years over which his observations extend. In 1715 they assumed the confluent form, and a malignant type; in the subsequent year their virulence was diminished; and in the winter of 1717 they disappeared altogether. In April 1721 the measles were epidemic; and in the spring of 1723 the confluent small-pox re-appeared, accompanied in some instances with petechiæ. In September, 1725, the measles of a mild character became epidemic, and continued through the winter; and in the summer of 1726 the small-pox took their place, also in a milder form than in 1723. In the autumn of 1729, a distinct kind accompanied an epidemic influenza, and in the following year were associated with measles and other exanthemata. In the winter of 1731, they became more malignant in character, but disappeared almost entirely as summer advanced. In the spring of 1732, they re-appeared in the neighbourhood, were confluent, and in summer were prevalent in the city, but in a milder form. In the winter of 1733 the influenza, which extended over Europe, was prevalent in York, and there was with it a few cases of small-pox: in the autumn the latter were more frequent, but of a milder kind, and maintained that character through the winter and spring of 1734: in the autumn of that year they became confluent.

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* Her son Bartholomew was baptized on the 23rd; and this infant, as often happens to infants in epidemics, appears to have survived (probably the only one of the family), the name never occurring in the register of burials.

The fevers noted by Wintringham were principally those dependent on malaria, and seemed to be every-day diseases. Intermittents of every type appeared in spring and autumn; in summer, bilious remittents, ending in regular intermittents. Cholera, dysentery, or intestinal inflammation usually prevailed in July, August, and September. Sometimes the cholera had a malignant type, and was fatal in a few hours, as in the summer of 1727. In May, 1719, a destructive "putrid fever," or, in other words, a typhus gravior broke out in York, and was at its height in July and August, just as in 1604 the plague was, 115 years before. Death in many cases followed on a sudden and violent diarrhœa, which symptom seems also to have preceded the outbreak of the fever. The weather was extremely hot and dry with little wind, and that little from the south until the middle of July, when a large quantity of rain fell, and the weather was cold for a fortnight; extreme heat then suddenly returned. It is remarkable, with reference to the sweating sickness, that in this fever, and in the summer remittents and continued fevers of succeeding years, copious partial or general sweats, with great depression of the powers of the system, were observed. In May, 1728, the "putrid fever" again broke out, concurrently with extreme heat after continued rains; it terminated occasionally in a fever of the remittent or intermittent form, as the heat declined. Wintringham remarks that, like all other epidemics he had noticed, it was ushered in by numerous cases of vomiting, diarrhœa, and profuse sweats, which he considered to be critical discharges of

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morbid humours, and as indicative of nature's method of cure. The "putrid fever" of this year was accompanied by an eruption not unlike flea-bites, and by a marbled redness of the skin, particularly about the chest. The breathing, before difficult, was relieved on the appearance of this eruption. This fever resembled, in all its essential circumstances, the puncticula, or febricula, called also febris stigmatica, and petechial fever, which prevailed in Europe first in 1490, and subsequently accompanied the sweating sickness. Hecker considers it to be a variety of the bubo or Levant plague; and it may be reckoned very properly amongst the pestilences of the city. In York, epidemic sore throat (scarlet fever of later years) preceded it in spring. Wintringham discusses the question how it was that the character of the fevers at York changed with the temperature; the malignant typhus becoming remittent as autumn advanced, the remittent changing into semi-tertian, quotidian, and tertian, coincidently with decrease of temperature, until quartans only appeared in winter, and then passing through the same phases reversely as the warmth of spring came on, and the heats of summer.* It is a remarkable lesson to theorists, that he neglected altogether the malaria arising from the stagnant surface water in the streets, from the putrid contents of the sewers, and from the deposits on the shores of the river, (as described by Dr. White,) and the effects of summer heat upon them, to discuss an unmeaning hypothesis.

The health of the city gradually improved concurrently with improved sewerage and drainage. The beneficial effects of Naburn Lock, and of a greater attention to architectural arrangements raised the ratio of mortality in 40 years from 1 in 21 to 1 in 28; so that the births exceeded the deaths; and for the first time, probably for centuries, the population of York increased independently of immigration. The epidemic exanthemata were still however fatally prevalent, as is shown by the numerous entries in the parochial registers, of death from small-pox and measles. The Rev. J. C. Camidge remarks that in the year 1785, of the 31 deaths registered in that year in St.

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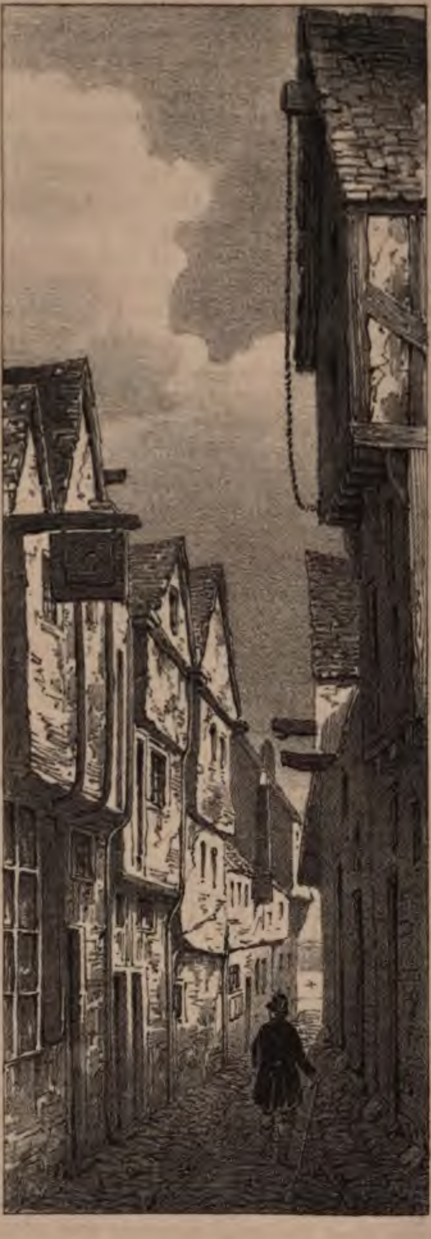
* "Quæst. 47. Annon successio harum febrium sibi invicem, pro ratione aucti vel diminuti caloris, tam in variis annis quam variis ejusdem anni tempestatibus, naturam et indolem earum eandem feres esse demonstrat; differentias autem a minori fluore lentores febrilis, et torpidiore sanguinis motu, in tempestate frigida; et a fluxiliori statu, agiliori motu, et majori forsan copia, acrimonia, et putredine in calidiore, plurimum pendere? durante autem calore regnavit febris putrida, hoc autem declinante, in intermittentem, et deinde hyemis frigore in quartanam convertebatur. Pari etiam ratione accedente vere, iterum surrexerunt intermittentes, quæ pro ratione caloris adaucti, febribus continuis similiores evaserunt, quosque tandem auctis ulterius volatilitate, acredine, et putredine materiæ, febrem putridam producebant. Et annon, hoc sic se habere exinde etiam patet, quod quo magis ad intermittentes perfectus vergunt febres, et longiori intervallo sibi mutuo succedunt paroxysmi, eo cæteris paribus, dissolventia fortiora postulant, et vice versâ; ut tam in remittentibus quam intermittentibus quotidianis, tertianis, et quartanis videre est?" p. 295.



FIRST WATER LANE, YORK.

R. Douglas, Del.

24
Standidge & Co. Litho London.

Sampson's, 20, the number dying, aged under five years, were from small-pox. Statistical data of considerable value might be obtained from the parish registers commencing with 1770-1780; as the causes of death are generally stated, and no doubt correctly, so far as regards the exanthematous fevers.

In 1832, when the epidemic cholera first appeared in England, the sanatory condition was still low, although when compared with the previous century it was improved to an extraordinary degree. The moats of the city were yet open and full of stagnant water; many streets were imperfectly drained, and others not drained at all. It will be seen, from the list of streets drained, that active measures were taken to remedy these defects by devising and executing new drains. The moats were also covered in, the houses of the poor systematically visited and cleaned, nuisances of all kind inquired into and removed; and to complete the arrangements for the expected foe, a house of recovery established. These plans, devised by medical science and forethought, and carried out in concurrence with the gratuitous assistance of medical men, are in striking contrast with those of the authorities in 1604, and the results were proportionally different. On June 2nd, 1832, the first example of the new pestilence occurred in Beedham's-court ("the Hag-worm's Nest"), situate in the locality already marked out as the habitat of the pestilences of 1551 and 1604, and by the 17th ten cases had been treated in that filthy court. On June 5th, a street scarcely less impure, the First Water-lane, furnished the next case, and the first death; and by the 21st 30 examples of the disease had occurred in that district. Other low-lying, ill-kept, and badly-ventilated parts of the city were next visited, and by the 15th the cholera had made its way into Coppergate, Hungate, Walmgate, Fossgate, Tanner-row, and North-street. From thence it extended to other districts, and on August 13th 162 deaths were reported in the newspapers. The localities of 145 of these are stated in Table 11, in the Appendix to my report on the present sanatory condition of York. It shows distinctly the connection between miasma and the susceptibility of persons living amongst them to imbibe fatal infection. On October 22, the disease had entirely ceased in the city.

In reviewing this historical sketch of the epidemics of York, the first and most obvious general fact is, that they were all most prevalent during the summer, and quiescent during the winter. In 1551, for example, in January, there was not one sick person in the whole city; but in April, as the spring warmth came on, so did the pestilence, and by the end of June had attained such malignancy, that the cruel measure was adopted of cutting off afflicted families from the assistance of their neigh-

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bours, and confining the healthy members of those families to the infected and confined air of their houses.

The following table strikingly exhibits this connection between increased temperature and increased mortality:—

Table 2.—Showing the Mortality in each Month of the three Epidemics, 1550-1, 1604, and 1832.

—	June.	July.	August.	September.	October.	November.	December.	Total Deaths.	Numbers living to one Death.
Deaths in the Parish of St. Martin cum Gregory, during the prevalence of the "sweating sickness" (?) in 1550, 1551	..	5	21	30	26	18	7	107	2
Deaths during the "Plague" of 1604, in 17 parishes . .	53	249	638	793	115	93	45	1,913	3
Deaths from the "Cholera Spasmodica" of 1832, in the whole city of York . . .	66	98	13	13	1	..	..	185	142

Further proof were scarcely wanting, as the history of all epidemics exhibits the same relations. The table is, however, a curious historical document, and is, I believe, unique. Indeed, our own modern experience of the cholera of the "plum season," recurs annually to convince us of this connection, and every year people attribute their attacks of "bowel complaint" to eating plums, or toasted cheese, or salmon, or to any cause except the true one, namely, the miasmata evolved from stagnant water, or impure drains, by the heat of summer.

Now, no one would be so illogical as to infer that it was solely the higher temperature that increased the mortality in the preceding epidemics, or how could the healthiness of dry hot seasons or climates be understood? or the commencement and greater malignancy of these epidemics in the badly drained localities of the city be explained? But if we suppose that it was the heat of summer and moisture co-operating to facilitate the chemical decomposition of organic remains, we can readily explain the whole matter. This connection between pestilential diseases and the decomposing *debris* of towns, and of congregated human beings, has indeed been long observed, although its vast importance has been rarely appreciated. Caius (or Kaye) in his "Boke, or Counseill against the Disease commonly called the Sweate, or Sweatyng Sicknesse," particularly refers to miasmata as the first cause, enumerating the foul air of camps, the emanations given off after great floods, or battles, or from putrefying locusts, or from the earth during earthquakes. "The v. cause," to quote his quaint language, "is close, and vnstirred aire, and therefore putrified or corrupt, out of old welles, holes in y^{e} gron̄d made for grain, wherof many I did se in & about Pesaro, in Italy, by openĩg thẽ aftre a great space, as both those cõtrimẽ do cõfesse, & also by exãple is declared, for y^e manye in openĩg thẽ vnwarely be killed." And his treatment is suitable to his doctrine: "Take away the causes we maye, in damnying diches, auoidynge cariõs, lettyng in open aire, shunning suche euil mistes as before spake of, not openynge or sturrynge euill brethynge places, landynge muddy and rottẽ groundes, burieng dede bodyes, kepyng canelles cleane, sinkes and easyng places sweat, remouynge dongehilles, boxe and euil sauouryng thynges, enhabitynge high and open places, close towarde the sowthe, shutte toward the winde, as reason will and the experience of M. Varro in the pestilẽce at Corcyra confirmethe." At the time Kaye wrote the above, there was certainly large room for the removal of "the cause;" for Erasmus asserted that in England "the floors of houses generally were made of nothing but loam, and are strewed with rushes, which being constantly put on fresh, without a removal of the old, remain lying there, in some cases, for 20 years, with fish-bones, broken victuals, and other filth underneath, and impregnated with the urine of dogs and men." The condition of the sewers and privies corresponded doubtless to that of the house. The epidemics of the middle ages were, in fact, so fatal and destructive, as described in the preceding pages, almost solely in consequence of the deficient architectural arrangements of the towns, and the want of cleanliness. The population of Europe was thus kept down by pestilence, as well as by war and famine, and its social progress retarded to an extent really incalculable. If, throughout England, the cholera of 1832 had been one-half only so fatal as the black death of 1349, or even as several of the later epidemics, the frame-works of society would have been loosened, and the empire in danger of being broken up. Those acquainted with the social effects of these scourges upon the thinly-scattered population of the middle ages would anticipate no less than this, from the destruction of five or six millions of persons in England within a few months. The utter depreciation of property, terror, despair, and a total abandonment of all social ties, would have been the consequence. In 1348, the people in general thought the springs and wells were poisoned, and thousands of Jews were slain with fire and sword as the poisoners, in conjunction with hundreds of Christians, their supposed accomplices. During the cholera epidemic in Europe, similar suspicions were muttered against medical practitioners, as well in England as on the continent; and some were even murdered in the streets of continental cities by mobs. Indeed it is but too probable that, if the deaths from cholera in England had increased so as to equal the mortality from the black death, the popular frenzy would have wreaked itself in an irresistible paroxysm of national mania, first, on the practitioners, and then on any class

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to which private malice might direct its malignant attention. It must be remembered, Government was quite unprepared for results of this kind; the mortality only was thought of. In about 49 years the population of England, already one of the most densely populated countries in Europe, will have doubled; and as the political danger of destructive epidemics increases with the population, it becomes an imperative duty to ascertain whether we are quite safe from the recurrence of these scourges; and if not, whether we have the means of placing ourselves beyond their reach. The state of our large towns and villages sufficiently answers the first; we certainly are *not* safe. With respect to the second, the more researches into the history of epidemics are prosecuted, and their nature ascertained, the more clearly it will appear, that by an improved system of public hygiene, society may be so shielded from their ravages as almost in effect to disarm them. Even those more recondite causes of epidemics,—great cosmic or telluric changes,—may be rendered comparatively innoxious by a proper use of medical science and observation. Delay, however, is dangerous; for we may infer, from the experience of preceding epidemics, that the cholera will break out again, and its second advent may be with such a coincidence of atmospherical phenomena as to equal in destructiveness the most virulent of the pestilences recorded in history. We may *hope* that this will not be the case; but when the momentous results of such a return are contemplated, society should have a more rational and certain safeguard against this and similar epidemics than an amiable hope.

T. Laycock, M.D.

York, March 23, 1844.

Different Rates of Mortality and of Births amongst the same Classes of Society living in the Suburban and Rural Townships and Town Districts of Sheffield, comprehended in the Ecclesall Bierlow Union on the average of three Years, 1839, 1840, and 1841.

Population. Town . . . . 27,280 Rural . . . . 4,348 Total . 31,628	Average Age at Death of all who have Died.			Average Age at Death of all who have Died above 21 years.			Proportion per Cent. of Deaths from Epidemics.			Proportion per Cent. of Deaths under 15 to Total Deaths.		
	Town.	Suburban or Rural.	Total.	Town.	Suburban or Rural.	Total.	Town.	Suburban or Rural.	Total.	Town.	Suburban or Rural.	Total.
Gentry, Professional Persons, and their families	46·33	70·	47·21	60·55	70·	61·01	10·57	..	10·18	1·1	..	1·1
Tradesmen and their families	27·19	27·	27·18	51·41	52·7	51·47	15·90	10·	15·65	5·12	·24	5·36
Artisans, Labourers, and their Families:—												
A. Employed in different kinds of Trade and Handicraft common to all places	20·70	34·32	21·57	53·57	50·16	53·19	24·29	..	22·73	12·39	·29	12·61
B. Employed in the various descriptions of Manufacture pursued in Sheffield and its neighbourhood	18·90	24·19	19·34	48·78	45·72	48·44	22·48	8·10	21·27	23·44	1·53	25·45
Persons whose condition in life is undescribed	13·16	26·97	15·04	48·90	63·12	51·89	14·23	9·52	13·63	4·69	0·53	5·22
Paupers in the Workhouse	35·51	..	25·51	63·38	..	63·38	23·43	..	23·43	1·29	..	1·29
Agricultural Population:—												
Farmers and their Families.	37·35	38·07	37·64	55·64	58·61	56·79	11·90	10·71	11·42	·67	·43	1·1
Agricultural Labourers and their Families	25·22	37·90	30·89	56·84	61·64	59·46	20·54	6·77	14·39	1·96	1·1	3·06
Total	22·64	38·02	23·65	52·65	54·96	52·98	20·58	7·11	19·13	51·15	4·11	55·26

Sheffield.

Sheffield.

Different Rates of MORTALITY and of BIRTHS amongst the same Classes of Society living in the Suburban and Rural Townships—*continued.*

Population.

Town 27,280
Rural 4,348

Total . 31,628

	Average premature loss of Life by Death below the experience of Carlisle, or a Healthy County, of all who have died.			Average premature loss of Life by Death below the experience of Carlisle, or a Healthy County, of all above 21.			Total Deaths, 1839, 1840, and 1841.		
	Town.	Suburban or Rural.	Total.	Town.	Suburban or Rural.	Total.	Town.	Suburban or Rural.	Total.
Gentry, Professional Persons, and their Families	..	..	..	1·45	..	·99	104	4	108
Tradesmen and their Families	11·81	12·	11·82	10·59	9·93	10·53	220	10	230
Artisans, Labourers, and their Families;—									
A. Employed in different kinds of Trade and Handicraft common to all places	18·30	4·68	17·43	8·43	11·84	8·81	424	29	453
B. Employed in the various descriptions of Manufacture pursued in Sheffield and its neighbourhood	20·10	14·81	19·66	13·22	16·28	13·56	605	74	679
Persons whose condition in life is undescribed	25·84	12·3	23·96	13·10	..	10·11	133	21	154
Paupers in the Workhouse	3·49	..	2·49	..	..	..	64	..	64
Agricultural Population:—									
Farmers and their Families	1·65	·93	1·26	6·36	3·39	5·21	42	28	70
Agricultural Labours and their Families	13·78	1·10	8·11	5·16	·36	2·54	73	59	132
Total	16·36	6·98	15·36	9·36	7·4	9·2	1,665	225	1,890

Different Rates of Mortality and of Births amongst the same Classes of Society living in the Suburban and Rural Townships—*continued.*

Separate Townships.	Proportion of Average Annual Deaths to Population.	Proportion of Average Annual Births to Population.
Nether Hallam Heeley Division	1 in 38	1 in 32
Ecclesall Bierlow	1 „ 44	1 „ 28
Nether Hallam	1 „ 45	1 „ 26
Beauchief	1 „ 45	1 „ 28
Totley	1 „ 51	1 „ 24
Upper Hallam	1 „ 54	1 „ 29
Norton	1 „ 62	1 „ 31
Dore	1 „ 70	1 „ 37
Town District	1 „ 44	1 „ 28
Rural District	1 „ 58	1 „ 30
Whole Union	1 „ 45	1 „ 28

Different Rates of Mortality prevalent among Classes of Persons engaged in the Manufactures of Sheffield, and resident in the Townships of Ecclesall Bierlow and Northern Division of Nether Hallam.

Population 26,280.	Average Age at Death of all who have Died.	Average Age at Death of all who have died above 21.	Proportion per Cent. of Deaths from Epidemics	Proportion per Cent. of Deaths under 15 to Total Deaths.	Average premature loss of Life to each Class by Death below the experience of Carlisle, of a healthy Agricultural Country. At all Ages.	All who Die above 21.	Total Deaths, 1839, 1840, and 1841.
Class 1. Gentry and Professional Persons	45·90	60·36	10·78	1·29	..	1·64	102
Class 2. Tradesmen	27·01	51·12	15·74	5·88	11·99	10·88	216
General Trades	20·57	54·31	24·88	14·33	18·43	7·69	414
Class 3. Artisans and Labourers. Sheffield manufacturing Trades. Silver and Plated Workers	18·69	63·	24·39	1·62	20·31	..	41
White Metal Smiths	17·75	34·	..	·22	21·25	28·	8
Saw Makers	13·94	44·33	29·63	·9	25·06	17·67	27
Edge Tool Forgers and Strikers	21·86	59·08	2·78	1·29	17·14	2·92	36
Table Knife Forgers and Strikers	19·43	56·	2·26	1·18	19·57	6·	31
File Forgers, Cutlers, and Hardeners	16·08	45·36	28·05	3·02	22·92	16·64	82
Table Knife Hafters	14·68	37·66	17·86	1·96	24·32	24·34	56
Spring Knife Cutlers	22·49	53·36	18·28	3·81	16·51	8·64	116
Razor Smiths	17·91	55·	22·22	1·06	21·09	7·	27
Scissors Smiths	15·86	38·43	21·05	·62	23·14	23·57	19
Fork Grinders	24·25	48·	..	·11	14·75	14·	4
Other Grinders	18·15	44·09	23·46	6·04	20·85	17·91	179
Comb Makers	15·23	64·16	33·33	·67	23·77	..	15
Various	19·20	49·89	23·68	4·03	19·80	12·11	114
Class 4. Undescribed Persons	27·98	48·6	14·06	5·20	11·02	13·4	128
Class 5. Paupers in Workhouse	35·51	63·38	23·44	1·51	3·49	..	64
Class 6. Agricultural Population. Farmers	38·09	55·63	12·20	·73	·91	6·37	41
Farm Labourers	26·10	56·71	19·40	2·01	12·90	5·29	67
Totals	22·58	52·70	20·82	57·53	16·42	9·30	1787

Huddersfield.

Different Rates of MORTALITY prevalent amongst different Classes of **Society** in the Huddersfield Union.

Population 107,054.	Average Age at Death of all who have Died.	Average Age at Death of all who have Died above 21.	Proportion per Cent. of Deaths from Epidemics.	Proportion per Cent. of Deaths under 15 to Total Deaths.	Average premature Loss of Life to each Class by Death below the experience of Carlisle, or a healthy Agricultural County.		Total Deaths, 1839, 1840, and 1841.
					At all Ages.	All who Die above 21.	
TOWN OR MANUFACTURING :—							
Gentry, Professional Persons, and their Families .	32	52	14½	1·3	7	10	117
Tradesmen and their Families	28¼	51	12	3·5	10¾	11	333
Artisans and their Families.	21½	49	19½	27·5	17½	13	1,735
Persons whose conditions in life is undescribed . . .	14½	54	14⅕	15·2	24½	8	968
Paupers and persons dying in the workhouse . . .	45	56	7½	·4	..	6	67
RURAL OR AGRICULTURAL :—							
Gentry, Landowners, and their Families	29	56	33	..	10	6	3
Farmers and their Families .	35½	53	13⅓	1·3	3½	9	194
Agricultural Labourers and their Families	30½	58	10½	1·9	8½	4	134
Totals . .	..	..	16½	51·3	..	..	3,551

Different Rates of MORTALITY prevalent during Three Years amongst Merchants, Manufacturers, and persons of different occupations connected with the Manufacture of Woollen Cloths in the Huddersfield Union.

Occupations.	Average Age at Death of all who have Died.	Average Age at Death of all who have Died above 21.	Proportion per Cent. of Deaths from Epidemics.	Proportion per Cent. of Deaths under 15 to Total Deaths.	Average premature Loss of Life to each Class by Death below the experience of Carlisle, or a healthy Agricultural County.		Total Deaths, 1839, 1840, and 1841.
					At all Ages.	All who Die above 21.	
Merchants	36	58½	21¼	·4	3	3½	33
Manufacturers	32	51	8¾	·8	7	11	69
Engineers	18	47	10¾	·6	21	15	37
Slubbers	13	31	13	2·2	26	31	100
Clothiers	33½	58½	16¾	16·0	5½	3½	1,322
Weavers	17	46½	18	14·8	22	15½	827
Cloth Dressers	20½	48½	16	5·4	18½	13½	291
Cloth Finishers	27½	56	17½	2·1	11½	6	120
Cloth Pressers	17	26	..	..	22	36	7
Woollen Spinners	20	46	28	1·3	19	16	68
Woollen Printers	14	45	10	·3	25	17	40
Woollen Millers	32	61	7	·8	7	1	47
Carders	25	35	33	..	14	27	3
Croppers	23	48	11½	·4	16	14	26
Dyers	20	42	13	1·1	19	20	61
Totals . .	..	..	16⅔	46·3	..	..	3,051

Leicester.

COMPARATIVE MORTALITY in the Drained and Undrained Districts of the Town of Leicester.

Streets.	1840		1841		1842		Average Age of Death for the Three Years.
	Average Age of Death in.	Proportion from Epidemics.	Average Age of Death.	Proportion from Epidemics.	Average Age of Death.	Proportion from Epidemics.	
East District.	Years.						
Culverted . . .	23½	$\frac{1}{4}$	24	$\frac{1}{12}$	26½	$\frac{1}{12}$	24⅔
Partly culverted .	17½	$\frac{1}{3}$	21	$\frac{1}{8}$	21½	$\frac{1}{6}$	20
Not culverted . .	13½	$\frac{1}{2}$	18	1	17½	$\frac{1}{7}$	16⅓
West District.							
Culverted . . .	20	$\frac{1}{6}$	30	$\frac{1}{14}$	29	$\frac{1}{12}$	26⅓
Partly culverted .	21	$\frac{1}{5}$	23½	$\frac{1}{8}$	22	$\frac{1}{11}$	22
Not culverted . .	14½	$\frac{1}{4}$	21	$\frac{1}{7}$	17½	$\frac{1}{9}$	17⅔
Streets culverted .	25½	The 3 years average 21, and rather more.	..	These years were taken because the year 1840 was remarkable for the increase of disease and the number of deaths throughout the town.			
Partly culverted .	21						
Not culverted . .	17						

STANDARD OF VITALITY ACTUALLY ATTAINED IN MIDDLE CLASS LIFE.

AVERAGE AGE of DEATH amongst the Society of Friends, of whom the number ascertained to be in the United Kingdom in the year 1840 was less than 20,000.

SOCIETY OF FRIENDS.

GREAT BRITAIN AND IRELAND.

Year 1841—42.

Total Number of Deaths.			Average Age at Death of all who have Died.			Average Age at Death of all who have Died above 20 Years.		
M.	F.	Total.	M.	F.	Total.	M.	F.	Total.
158	189	347	48·80	55·13	52·25	61·58	62·39	62·05

Year 1842—43.

Total Number of Deaths.			Average Age at Death of all who have Died.			Average Age at Death of all who have Died above 20 Years.		
M.	F.	Total.	M.	F.	Total.	M.	F.	Total.
160	196	356	45·22	52·77	48·78	60·96	63·45	62·40

Leicester.

Average Age of Death amongst the Society of Friends—*continued.*

London and Middlesex, York, Lancaster, Essex, and Westmoreland: 1811—30.*

Total Number of Deaths.			Average Age at Death of all who have Died.			Average Age at Death of all who have Died above 20 Years.		
M.	F.	Total.	M.	F.	Total.	M.	F.	Total.
29·54	31·59	61·13	40·27	43·19	41·78	59·12	58·96	59·03

* This return of deaths from 1811 to 1830 is from the registered ages of deaths in the burial-grounds of the Society, embraces all who were buried in them, and includes many who were not in membership with them. The returns of the deaths in Great Britain, made up for the years 1841 to 1843, are strictly limited to the members of the Society.

Proportions out of 1000 Deaths at different Periods of Life, in the Society of Friends, and in the General Population of England and Wales.

Age.	Society of Friends. Great Britain and Ireland.		General Population of England and Wales, Four Years, 1837–1841
	Year 1841–42	Year 1842–43	
Under 1 year*	. .	78·6	216·1
Under 5 years	98·	148·9	396·8
From 5 to 10 years	28·8	36·5	50·8
,, 10 to 15 ,, ...	17·3	8·4	26 9
,, 15 to 20 ,, ...	34·6	50·5	34·9
,, 20 to 30 ,, ...	74·9	84·3	77·7
,, 30 to 40 ,, ...	63·4	67·4	66.3
,, 40 to 50 ,, ...	80·7	50·6	61·5
,, 50 to 60 ,, ...	100·9	89·9	61·8
,, 60 to 70 ,, ...	152·7	126·4	79·8
,, 70 to 80 ,, ...	204·6	165·7	84·8
,, 80 to 90 ,, ...	126·8	146·1	50·7
,, 90 to 100 ,, ...	17·3	25·3	7·7
,, 100 to 115 ,, ...	. .	. .	·3
All ages	1000·	1000·	1000·

* The numbers in this series are included in the next, "Under 5 years."

In the city of Geneva, where the average age of death appears to be the highest yet ascertained of the whole population of any city, being upwards of 40 years, or 10 years higher than in in London, the births but slightly exceed the deaths, and there is but a slow increase of the population. In the community from which the above returns are taken, in which there is great attention to temperance, cleanliness, and order, and in which an average duration of life of from 12 to 14 years above the experience of the Carlisle table is attained, and in which a marriage under age is unheard of, and improvident marriages are rare,—it is stated on good authority, as a well known fact, that amongst this population also the annual number of births only slightly exceeds that of the deaths.

SAMUEL HOLME, Esq., of Liverpool, Builder.

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THE position of Liverpool is eminently favourable for carrying out those general improvements so necessary for ensuring the comfort of the population. It is situated partly on the crest of a minor elevation extending from the site of the old dock, along Paradise-street, Whitechapel, Byrom-street, and Scotland-road, and returning to the river, and partly on the side of the ridge of hills forming part of Everton, Edge-hill, and Toxteth Park; the valley between the two having been the original natural ditch or streamlet which discharged itself into the old pool, on the site of which the Custom-House is now built. That valley, now occupied by the streets above mentioned, was therefore the great drain formed by nature to carry off the water from both hills.

2. About two-fifths of the substrata of Liverpool is clay, which rises to the surface of the ground in many places, but is generally covered with a coating of soil of about 15 inches to 18 inches thick. The clay extends from the river to Scotland-road, and follows the old stream before mentioned to the top of Whitechapel, when it ceases; and a line drawn from this place to the river at the south end of the Prince's Dock encloses all that portion of the town which stands on a subsoil of clay, and which is proverbially the coldest and most unhealthy part of the town. Along the banks of the old stream, for a distance of about 100 yards on each side, we find little else than a bank of mud, evidently deposit, with occasional beds of gravel, and in a few instances irregular rock. Between the site of this stream and the southern and eastern boundaries of the town, there is an admixture of yellow sand, and red and yellow rock of a shelly nature, lying in beds of about an inch or two in thickness, and generally resting on good rock of a solid nature at an average depth of 15 feet.

This part of the town is inhabited by the upper classes, and is, with a few exceptions, (such as Crosby-street,) unquestionably the healthiest. From an intimate knowledge of many of the large towns and cities of the empire, I unhesitatingly assert that the facilities for drainage in Liverpool, both from its peculiar position and its geological character, are inferior to none, and that *it is capable of being rendered as healthy as any town in the kingdom.*

3. Some years ago the water from the higher levels was intercepted; and instead of running down into Whitechapel, which is below the level of a 20 feet tide, (taking the datum of the old dock sill,) was carried off both at the extreme north and south ends of the town; and from this circumstance, and also from the number of new sewers which have been formed during the last 10 years, we have not had those serious floods with which we were formerly visited.

4. There are many obstructions to the natural drainage, in consequence of the numerous small outlets which formerly discharged

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themselves into the river having been stopped up, and their sites covered by buildings, docks, wharfs, and other commercial depôts; and this renders it doubly necessary to provide artificial drains, not only to take off the surface water which by these rivulets formerly found its way into the river, but also to take off the foul water engendered by our numerous manufactories, and from our thousands of dwellings, a great portion of which, at the present day, is discharged on the surface, and evaporates in pestilential exhalations.

5. Liverpool has suffered from the want of a correct public survey, comprehending a system of levels from some common datum, to which architects and builders might have free reference. Nothing of the sort, as yet, so far as I know, has been done. No systematic plan has been originated on a comprehensive scale; and not one builder in ten takes any precaution as to *internal* drainage, partly because in great numbers of streets there are no public sewers, and partly because there has been no legislative enactment to compel him to do so. Without such enactment I despair of seeing a better state of things. Two-fifths of the land within the ancient limits of the borough belongs to the corporation, and they might make it a stipulation that every lessee should have perfect internal drainage, but without a compulsory act, two-fifths of the remaining property in the borough would, I am convinced, be left as it is, even if there was a sewer in every street into which they could discharge their overflows. In truth, from the absence of any systematic and compulsory arrangement, every man has built as it has pleased his own fancy, and little precaution has been used as to drainage. There are thousands of houses and hundreds of courts in this town without a single drain of any description; and I never hail any thing with greater delight than I do a violent tempest, or a terrific thunder storm, accompanied by heavy rain; for these are the only scavengers that thousands have had to cleanse away the impurities and the filth in which they live, or rather, exist. Much of this evil will, however, be remedied by the Health of Town Bill, which is now in operation, and which compels attention to cleansing courts.

Then, again, except where the corporation obtain a local Act to widen a specific thoroughfare, we have no plan for laying out our public streets, nor any structural arrangements to regulate their width, or the description of dwellings to be placed upon their margin. The Finance and Improvement Committees of the Council have indeed a veto on all elevations of buildings placed on leasehold land, the fee simple of which is vested in the corporation; but this very circumstance operates most ridiculously. The corporation have, perhaps, one-third of a street, and that, not in continuous property, but here a lot and there a lot. For example, I hold a piece of freehold and a piece of leasehold in the same street. For the latter I submit an elevation, which is sanctioned by the committee, and I am restricted from placing on it a steam-engine,

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a chandlery, and other noisome trades. But on the adjoining lot I can place any of these; and as the corporation does not possess any plan of the elevation of the various streets, they sanction isolated elevations without knowing what is built, or intended to be built, on the adjoining property, and we have consequently buildings without any uniformity,—warehouses, shops, and offices, intermixed with dwelling-houses of various heights and various characters, and a mass of incongruity is the natural result.

In Liverpool, too, with the exception of Lord Derby and Mr. John Leigh, we have no very large landholders. The soil is subdivided into a multitude of holdings, and a man runs a new street, generally as narrow as he possibly can, through a field, not only to save the greater expense of soughing and paving, which, in the first instance, falls upon himself, but also that he may have a greater quantity of land to dispose of. The next owner continues that street, if it suits him, but he is not obliged to do so, and the consequence is, the growth of narrow thoroughfares, the erection of mean edifices, the utter neglect of proper sewerage, the inattention to ventilation, and that train of evils which is so much to be deplored, is the inevitable consequence. If we could have a good public sewer in *every* street, sufficiently deep to drain every cellar, and a proper system of levels adopted, and each person was obliged to make branch drains into the general sewer; and if, in addition, a general plan was arranged for the future extension of the town, it would be of incalculable advantage. Very much has, however, been done of late years by the Commissioners of Sewers.

6, 7. The regulations of the Health of the Town Bill lately passed will show what provision is made for the future construction of courts of houses, by which I mean houses built in rows and fronting each other, for the dwellings of the poorer classes; but these provisions, admirable in themselves, are at best but partial and *prospective*, and do not reach the *existing* evils. In numberless instances, courts and alleys have been formed without any declination for the discharge of surface water. Many are laid without channels; and while the solid refuse thrown upon them rots upon the surface, the liquid matter is absorbed, and much of it finds its way into the inhabited cellars of the courts. The north end of the town is full of pits of stagnant water, which form so many receptacles for the putrid matter that is constantly thrown into them, such as dead animals, the drainage from starch and other manufactories, and in hot weather the stench from these places is frequently intolerable. The whole of the north end of the town being, as I have before described, a bed of clay, these poisonous pools are never lessened except by evaporation; and from these, and the imperfect drainage, and other causes to which I shall advert, instead of being surprised at the mortality of Liverpool, I am surprised that the mortality, taking all things into consideration, is so exceedingly small.

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8. The privies of the houses built in these courts are, in almost every case, improperly situated, and are utterly inefficient for purposes of convenience, much less of decency. Generally, a court containing 16 houses will have two single privies, for the accommodation of a population averaging 80 persons. They are almost always built between the two upper houses at the top of the court, but sometimes at the street entrance, leaving only a passage between them of three feet broad, for the ingress and egress of the whole of the occupants. The ash-pit, which is destined to hold the offal from all the houses, is generally about four feet long, three feet broad, and five feet deep; this is speedily filled, and the filthy water oozes through the sides, or finds, by capillary attraction, its way into the nearest cellars; most of these courts are built up at the ends, and the houses are placed back to back, there is therefore no thorough ventilation, and as there is no underground drainage, the stench is horrible. Yet thousands of our poorer classes are living, or prematurely dying, in these fever succession houses. There are no public necessaries whatever, and not a public urinal in the whole town, except three small unsightly ones opposite the sessions-house.

9. The house drains, where they do exist in the better class of houses, are not properly cleansed by water; nor is there, except in comparatively few instances, any precaution taken to trap the drains, and so prevent the stench from rising through the apertures.

10. Even the public sewers are not constructed either to be washed out by sluices, or to prevent the emission of smells from the mouths of the gratings in the streets. Large accumulations of decomposing refuse are found in them when occasionally opened, and the miasma continually arising through the openings of the eyes is very offensive. This might easily be avoided by having a cesspool properly trapped in each branch leading from the side eyes which are covered by the street gratings, and which would completely prevent the stench from rising through them. The Commissioners are now desirous of remedying this defect.

11. Notwithstanding the Commissioners of Sewers have expended above 100,000*l*. in new sewers and paving during the last few years, very much remains to be done, even in the principal thoroughfares, before our sewerage can be considered to be accomplished. And although the Commissioners will permit (strange that permission should be necessary) any person on application to make a branch drain into the public sewer, on payment of the sum of 18*s*.; yet with strange perversity they forbid an overflow from a water-closet to be turned into them, and the consequence is that nearly all the water-closets are discharged into open ash-pits or cesspools, impregnating the atmosphere in numerous places, and exposing that offensive matter to the surface, and to the decomposing effects of the atmosphere, which ought to be carried by the

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public sewers into the main artery of the river, and the air is thus tainted through the mistaken views of those whose functions it especially is to provide the means of carrying off this effluvia.

13. Our street sewers are commonly of the egg-shape, which is undoubtedly the best. The general size is three feet nine inches high, by two feet nine inches wide; and when the owner of any property is desirous of turning in a branch drain, the latter is at least one foot in diameter, with a nine-inch rim. The cost of our public drains, of the size above mentioned, is, as near as may be, taking a fair average, 20*s.* per lineal yard, and the branch drains 11*s.* perl ineal yard, but these prices include opening the ground, filling in again, and repaving or reflagging over the top.

14. I am not aware that our public sewers are ever cleansed, except by the rain. Some years ago the old sewers in Paradise-street and Whitechapel, being about the level of an average tide, used to be cleansed out by men who went inside for the purpose, and the deposit was lifted out at various vertical apertures by buckets; but I think that since the formation of the new sewers this is no longer practised. The cleansing of the sewers is however under consideration.

15. There are scavengers, (generally paupers,) employed in cleansing the surface of the streets. The parochial authorities contract with parties for the removal of the mud, &c., for manure; but I am not aware that there are fixed gangs of men to certain districts, for I believe that when the superintendent reports upon a street it is ordered to be cleansed. On this point, however, I do not speak with certainty; but, generally speaking, the streets are in a filthy condition in the lower and northern parts of the town, and are, at certain seasons, especially near the docks, almost impassable.

16. The courts and alleys which are inaccessible to carts are not cleansed by the parochial authorities, but are left to the inhabitants to cleanse or not at their pleasure; and the result is, that great numbers of the courts inhabited by the lower orders receive little or no cleansing except that which Providence showers from the clouds. This, however, will be amended by the local Act to which I have already adverted.

17. Few of the houses of the middle and poorer classes are provided with proper dust-bins or ash-holes, in many of the leading streets where land is valuable; and I have already stated that the courts inhabited by the poorer classes have middens so small and inefficient that there is no room in them for the refuse, and there are thousands who throw that refuse upon the public highways, notwithstanding the penalty to which they subject themselves by doing so.

18. The highway board have a yard in Arrad-street where refuse has been deposited, but the inhabitants complained of the smell which arose from it. The quantity, however, deposited there

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was small. The corporation have provided a receptacle near the canal, which is extensively used, but the largest quantity is taken to various yards near Leed's-street, which lie on the bank of a branch of the canal, and it is taken from thence in flats up the country for agricultural purposes.

19. The local authorities intrusted with the management of the sewers, the lighting and cleansing of the streets, &c., are, first, a committee of the town council called the Watch Committee, consisting of 25 members, and who devote a great deal of time to the purpose. They have also the management of the police. Next are the highway board, commonly called the Commissioners of Sewers. Their functions are principally directed to the formation of sewers, watering the streets, repairing the footpaths and pavement of the streets.

Fifteen are elected by the rate-payers in public vestry, and are formed and act under special legislative powers, and nine members are nominated by the Council, who pay 5000*l.* a-year towards the funds.

There is also, of late, a special committee of 16 members of the council, called the Health of the Town Committee, whose province it is to carry out the local Acts connected with buildings, and other general matters. These various boards consist of active men, well versed in local affairs, but it has always appeared to me that unity of purpose is not obtained by having separate committees of action.

I think that if these bodies could be amalgamated, and our watching, police, lighting, sewering, and cleansing, together with the regulation of our buildings, were all placed under one committee, acting in unison; and if they, in fact, were resolved into a minor corporation, much confusion would be avoided, and much benefit would result. There would be no jealousy of separate power, "Ephraim would cease to vex Judah," and as, with the exception of that part contributed by the corporation, all the remaining funds are levied by rate on the inhabitants, a committee might be created of 42 members, 28 being elected by the rate-payers, and 14 nominated by the corporation, and by the abolition of the cumbrous machinery of separate boards, or rather its re-arrangement under one head, unity of purpose and vigour of action would be obtained.

20. I have already glanced at the evils arising from narrow streets, and I should be glad to see a general survey made of the environs of Liverpool, and a local Act obtained to prevent such miserable thoroughfares; and without power is granted by the Legislature to compel landowners to make public streets of a suitable width, I fear it will never be done.

21. It is unnecessary for me to reply to this question. The melancholy facts elicited by previous inquiries, clearly show that Liverpool contains a multitude of inhabited cellars, close and

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damp, with no drain nor any convenience, and these pest-houses are constantly filled with fever. Some time ago I visited a poor woman in distress, the wife of a labouring man. She had been confined only a few days, and herself and infant were lying on straw in a vault through the outer cellar, with a clay floor, impervious to water. There was no light nor ventilation in it, and the air was dreadful. I had to walk on bricks across the floor to reach her bed side, as the floor itself was flooded with stagnant water. This is by no means an extraordinary case, for I have witnessed scenes equally wretched; and it is only necessary to go into Crosby-street, Freemasons'-row, and many cross-streets out of Vauxhall-road, to find hordes of poor creatures living in cellars, which are almost as bad and offensive as charnel houses. In Freemasons'-row I found, about two years ago, a court of houses, the floors of which were below the public street, and the area of the whole court was a floating mass of putrefied animal and vegetable matter, so dreadfully offensive that I was obliged to make a precipitate retreat. Yet the whole of the houses were inhabited!

22. The recent local Act, by prohibiting courts being laid out narrower than five yards, and preventing their being built up at the ends, will prove of great value. But as it is not retrospective, and cannot alter existing property, much of the evil arising from bad ventilation will remain. But every court in the town may be properly drained, and receive such a declination as will throw off the water. They are capable also of having proper receptacles for soil.

23. Liverpool is admirably supplied with school-rooms for the children of the labouring classes; in almost all these schools great attention has been paid to warming and ventilation. Many of them are well sewered, they have spacious necessaries, good playgrounds, and are fitted up with every convenience. I should think no town in the kingdom is better provided with school-rooms, and they are to be found in every part of the borough.

24. We are not so well provided with places of recreation, such as parks or open and convenient places for the use of the lower orders. The numerous steamers, however, which are continually plying on the river, take great numbers to all parts of the Cheshire coast, and supply, in some degree, the want of parks. There is a spacious marine parade at the Prince's Dock, and several of a smaller description on the margin of the river. The Mount Gardens used to be well frequented, but since they have been surrounded by buildings they are not much used. The Council is well disposed to form a public park, and the subject has been discussed, but the value of land is so great in the vicinity of Liverpool, and the Council have had so many demands upon it, that they do not feel justified in incurring such an expense. A park would undoubtedly be a great public advantage.

25. There are public baths, of a spacious description, which belong to the corporation, and are leased out. The charge for a

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bath is 1*s*. For a warm bath 2*s*. The water is raised from the rivers by a steam-engine, and, being filtered, is pure and pleasant. These baths are not frequented by the lower orders on account of the price of admission; but the corporation have built baths and wash-houses at the south end of the town, where the price for a bath is twopence, and if the state of the corporate funds would admit of it, the Council would erect a similar establishment at the north end of the town; and I have little doubt, from the great use of the one already in operation, that another, if not two such establishments, will be speedily erected.

There is no other public bathing establishment in the town; but great numbers use the caravans on the north shore, and many of the poorer classes undress on the sand of the shore; but this is extremely unadvisable, and even indecent, the shore being now so public, and the frontage to the river so covered with dwelling-houses.

26. Liverpool is supplied with water by two public companies, each having an Act of Parliament, which confers upon them a monopoly of supply. One is termed the Bootle Water Company; the other the Liverpool and Harrington Water Company. The former Company raise their supply from springs at Bootle, distant from the Exchange three miles; and the latter have wells in various parts of the town. The original shares of 100*l*. in the Bootle Company are now worth, in the market, 380*l*., and those of the Liverpool and Harrington Company are worth 610*l*. The charge for supplying water for domestic use is one shilling in the pound on the rental, and it is usually supplied every other day. It therefore follows that had the corporation or the parochial authorities originally supplied the water from the public funds, and no legislative enactment had given to these companies exclusive privileges, that we should have been supplied with water at one-sixth of the present price; or if we had paid the same price, a large disposable revenue would have accrued to the public local exchequer, which would have diminished our taxation, or have enabled the authorities to have established public fountains, and had public reservoirs for the use of the poor in every locality.

The many calamitous fires which have occurred, and which, since the commencement of the present century, have destroyed buildings and other property exceeding two millions in value, have at length roused the attention of the whole community. It has frequently happened that, at the commencement of a fire, an hour or two has elapsed before any water could be obtained. There are stipulations in the Companies' Acts that they shall supply water in case of fire, but as no penalty is attached, and as fires generally originate in the night, it has so happened that we have seldom been supplied until a fire has widely spread, and then not in sufficient quantities.

Power was therefore obtained during the last session to levy a rate upon the inhabitants, sink wells, and lay pipes in such of the streets as the Commissioners may deem fit; but from the oppo-

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sition of the Water Companies, there is a restriction imposed, viz., that such water shall be used only for public purposes, viz., watering the streets and extinguishing fires, and consequently the inhabitants will have to pay for water which they are prohibited from using for domestic purposes; and we shall yet be subjected to the exorbitant charges made by the two Companies.

27. The water, however, which is supplied by them is extremely pure and good; which, indeed, is the case with all the water raised from springs in this vicinity; and no complaint is ever made of its quality. It is carried under the streets in iron pipes, and there are branches into the private cisterns. In the poorer neighbourhoods there is usually a cock in each court, and the inhabitants carry it and store it in jugs or wooden vessels from day to day; but, compared with the dense population, the supply is totally inadequate, as the turncocks of the Company cannot allow it to run a sufficient length of time; and many of the habitations of the poor (whether from this circumstance, or from inherent habits of filth, I do not venture to say) have never had their boarded floors properly scoured since the houses were erected. Many of the poor beg water,—many steal it; and if the Companies were to prosecute all such cases, I apprehend that a magistrate would not find time for much other employment.

33—45. The complaints as to the scarcity of water in cases of fire, and also as to the present prices of that much-needed commodity, are both loud and general; but the companies, who have a valuable property in the monopoly, and whose shares are at such a high premium, do not see fit to lower their price; and so long as both companies have a mutual understanding, they may advance the price or make specific agreements as favourable to themselves as they choose; and I am not aware that any one has redress. If you don't like the price, you need not take the water. But what are you to do? The supply of rain-water is uncertain, and it is so impregnated with soot that it is not fit to drink. You cannot go to the expense of sinking a well 100 feet deep, and you have therefore no resource but to pay. There are no stand-pipes in the town for cleansing foot-walks; and, with an exception or two near the docks, no watering places for cattle.

46. We have an admirable fire police, well officered and disciplined. They are provided with excellent engines and material of all descriptions; but I have seen stacks of buildings in flames, and this efficient body of men rendered powerless for want of water. I feel confident, from experience and observation, that when our new arrangements are made, and we have mains in each street, always kept full of water (which is not the case at present), our fire brigade will be equal to any emergency.

For answers to the subsequent questions I must refer to the pamphlet of Dr. Duncan, and to that statistical information which can be given with greater correctness by the parochial authorities. In respect, however, to ventilation, I may observe that it is not

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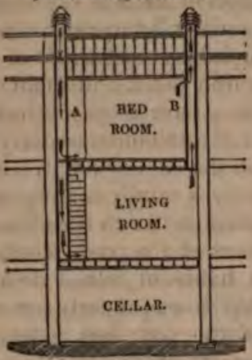
generally understood, and consequently not sufficiently valued even by many above the ranks of the poor. Few indeed are the dwellings in which proper apertures for ventilation are constructed; and, since the introduction of gas, it is more than ever necessary.

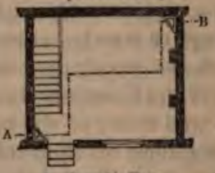
The annexed is a simple mode of ventilating a room, which costs a mere trifle, and if adopted would be very useful. The stench in many of our courts is most abhorrent, arising from their narrowness, their being blocked up at the ends, the garbage and fluids thrown on their pavements, the insufficiency of their privies, and their want of sewers; but the air of the interior of thousands of the dwellings is, if possible, much worse. There is a sickening smell and a closeness which makes it wonderful how human beings can exist in them; and it is well known that, in houses not exceeding 12 feet square, with one bed-room and a low attic, there are often found 20 to 30 persons huddled together. I will mention a circumstance which came under my own observation:—About six years ago I had occasion to examine some property in C—— street, and it being in the summer, I went at six o'clock in the morning. I found in one bed-room about 20 persons, nearly all adults, and of both sexes. They were lying on coarse beds, adjoining each other, on the floor. I was witness to scenes of great indelicacy; and among the occupants were several young females of 18 or 20 years of age, who, when dressed, had an appearance of decency; and one to whom I spoke did not appear to think herself degraded by her situation. This was a lodging-house. The atmosphere of such places is poisonous.

[Section through line A. B.

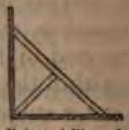


A. Flues for descent of pure Air.
B. Flue for ascent of vitiated Air.

[Ground Plan.]



A. Pure Air Flues.
B. Vitiated do.



Enlarged Plan of Pure Air Flues.

It has often occurred to me that it would be a great public convenience if all the gas and water pipes in our streets could be enclosed in large chambers. The present mode of imbedding our gas and water pipes in the soil is attended with these disadvantages:—Whenever a pipe wants repairing, the paving of the street must be taken up, an excavation must be made, and the rubbish, during the repair, is an obstruction to the public thoroughfare. In

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addition, the soil thrown in again settles down, and the pavement is loosened; and it frequently happens that a second relaying of the pavement is requisite before the ground becomes solid. Besides, we have frequent escapes of gas from defective joints; and the continual tearing up of the streets is a great nuisance. This might be avoided if all the pipes were contained in a sewer or chamber, with proper eyes at stated distances for ingress and egress; and it would be very easy to ventilate these chambers by upright shafts every 60 or 80 yards, which might be carried up as chimneys in or alongside the adjoining buildings, and would deliver the foul air above the tops of the houses. I have long desired to see such a plan carried out, but fear that in Liverpool it would now be impracticable, except in streets yet to be formed.

Several of the remaining questions I pass over, as they are not within the scope of my practical experience and observation; but on a subject of such paramount importance as the health of our large towns, I shall stand excused by hazarding some general remarks connected with and arising out of the consideration of the subject. Having been extensively engaged for 28 years in buildings of every description, from the most stately of our public edifices to the humblest cottages of our labouring poor, and having in my early years assisted, as a workman, not only to erect many buildings, but also to construct many of the sewers of that period, I am fully aware of the general defects under which we labour in our great towns, and of the difficulty which our public boards find in adopting the proper remedies. Having a considerable number of workmen in my own employment, and being, from my peculiar engagements, brought into daily contact with all classes, from the highest to the lowest, I can speak from experience upon some subjects on which many men can only theorize. Generally, I am averse to legislative interference with the details of constructing our dwellings. It brings men under the surveillance of surveyors and others, who, frequently elected to their situations by political or other influence, and often ignorant of the general principles of science, exert their brief authority in a manner so arbitrary that feelings are engendered which defeat the best plans, more particularly when it occurs that a man of ability is controlled by a public officer, whom he knows to be profoundly ignorant, or only partially informed, on the very subject with which it is his duty to be acquainted. I beg, however, in making this remark to observe that I do so only on general grounds; for it is a fortunate circumstance that in Liverpool we possess public officers in every way competent. It would be extremely difficult to find in any place a man of greater attainments and practical information than the surveyor of the Sewerage Board, or one more attentive than the surveyor to the corporation. But all rules have their exceptions; and where mankind congregate in masses, it is as much the duty of the civil governor to interfere in sanatory matters as it is for him to direct

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our police to pay attention to public weights and measures, or to make bye-laws for the government and regulation of our hackney-coaches. The man who, in a crowded street, is living in filth and breathing a putrid atmosphere, or who makes that street a receptacle for the offal which he casts from his dwelling, becomes the instrument of danger to his neighbour by spreading infection, and he not only hazards his own life but endangers that of others. The man who erects a flimsy edifice in a crowded thoroughfare, which by its falling may destroy life, should be prevented doing so; and he who constructs a house to let for profit, and pays no attention to those matters which are essential to comfort, but, on the contrary, so constructs it as to engender fever, and endanger the lives of his tenants,—all these are cases where, with propriety and in justice, the Legislature ought to interfere, and to insist upon such a mode of construction as will not endanger human life. The subject then resolves itself into a few general heads, viz.—

1. Width of public thoroughfares.
2. Proper construction of the frame-work of all buildings, so as to ensure their stability, by which I mean the strength of the external walls and the bearing-timbers.
3. The width and ventilation of courts or wynds.
4. Public sewers.
5. Private sewers.
6. A copious supply of pure water.

On each of these heads I propose to offer a few observations.

First, the width of public thoroughfares. I have already stated, that by the subdivision of land in this neighbourhood (and it is generally the case in all our large towns), it is impossible for the public authorities to compel any man, in laying out his own land, to make a thoroughfare any other width than he chooses, notwithstanding that in a few years it will become a public street, and be kept in repair at the public expense. Nor ought a man to sacrifice his property without remuneration. What then is to be done? A special Act of Parliament is expensive,—it cannot, in many cases, be obtained except by a rate on the inhabitants; and without some general plan the local legislation would be piece-meal, and consequently inefficient. To widen a street in the middle of a large town, like Liverpool, Manchester, or Leeds, is a costly matter. The value of the land is so great, the purchase of the leases so enormous, and the claims for compensation so terrific, that it requires a bold man to propose it. The widening of Lord-street alone cost the corporation nearly 100,000*l*. I see no remedy for the existing evil in this respect, but it may be avoided in future. If a general and correct survey was taken of the suburbs of large towns (and probably the Ordnance Survey would be sufficient), and if general plans of extension could be arranged on a comprehensive scale, with widths of streets defined upon it; and if it was made compulsory on every owner of land to contribute a certain quantity or width, and the magistrates were empowered to levy a rate to remunerate him, according to the valuation of three surveyors chosen in the usual manner, for the quantity he gives up beyond that width, no injustice would be done to the individual, and the public would only pay for the accommodation which such extra width of thoroughfare would afford. For instance, it is desirable that no leading thoroughfare should be less than 20 yards wide, no secondary street less than 14 yards, and no back street less than 10 yards. In the first case, let the landholder contribute 10 yards, and the public pay for the additional 10 yards. In the second, the landholder contribute 8 yards, and the public pay for 6 yards. In the third, the landholder contribute 6 yards, and the public pay for 4 yards. This would be an equitable arrangement, very simple, and easy to be carried out. Private property would not be invaded for public benefit, nor would the public have to pay at a remote period for the widening of our streets, with the enormous additions of increased value in land, buildings erected upon them, purchase of leases, and compensation to tenants.

Had our ancestors adopted such a plan a century ago, the corporation of Liverpool had been at this time wealthier by half a million of money, our parochial rates would have been comparatively light, and Liverpool would have been as healthy as any town in England. The necessity for public parks would be materially lessened by spacious and airy suburbs, and although the bare mention of a rate would at first cause an outcry, I am convinced, that on reflection, it would be generally acquiesced in, and a penny or three half-pence in the pound upon the rental of any town would be ample, if continuous, to carry out such a design.

On the second head, viz., the proper construction of the framework of all buildings, I need say nothing in reference to Liverpool, as it already possesses a Building Act which is strictly enforced, and a different and improved mode of building has resulted from its salutary provisions. It is, however, defective in some respects, and if, instead of the interference of the magistrates, all of the departures from the provisions of the Act were first submitted to and sanctioned by a Board of Surveyors, it would be preferable, because, in some cases, departure would be an improvement, and while a magistrate cannot be a judge of such matters, he has no resource but to convict, even though such departure should be proved before him to be advantageous.

The next proposition is, the width of courts and wynds. And here, too, I am happy to say, that a great improvement has taken place in Liverpool, which ought to be extended to every large town. A local Act, designated "The Health of the Town Bill," has been obtained, and its provisions are attended to by a Com-

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mittee of the Council and two district surveyors. It provides that opposite rows of houses shall not be built where there is a carriage-way, except they are separated by a street of 24 feet wide, and where there is no carriage-way by a space of 15 feet. Each house must have at least one room on the ground-floor, containing in the clear 108 superficial feet, the height of the rooms to be not less than 8 feet, except the attic, which may be 7 feet. Each room, not an attic or cellar, is to have a window containing not less than 15 superficial feet, and those of attics and cellars not less than 9 feet. All windows are to be made to open. All inhabited cellars are to have two feet of their height above the level of the ground. The Committee are empowered to compel the construction of proper privies and ash-pits; to cause the proper drainage and sewerage to be done, and the removal of all offensive matter; and the Council are empowered to make byè-laws to ensure proper drainage, cleansing, and flagging, &c. The Act, as far as relates to general construction, came into operation on the 1st November, 1842, but in reference to the inhabited cellars of old houses, does not take effect till the 1st July, 1844. It is likely to prove a great blessing to the town, and will tend most materially to remove many of those causes of unhealthiness which have unhappily rendered Liverpool so notorious. It is, however, a misfortune that it has to be carried out by an ever-changing body; when a gentleman has made himself master of its salutary provisions, and has become acquainted with the various localities, he is probably rejected by his constituency, and new men are introduced who have everything to learn. However much it is to be lamented, it cannot be avoided, and it is inseparable from our municipal institutions.

The fourth head is that of public sewers.

These are constructed, as I have already stated, under the superintendence of a separate and distinct Board, constituted under an Act of Parliament. It consists of twenty-four members, viz., fifteen elected by the rate-payers, and nine nominated by the town council.

They levy rates upon the inhabitants, to raise funds as they are wanted; and they meet every Thursday for the transaction of business. All questions connected with the soughing and paving of the town are decided by them. The town is divided into districts, and three of the body are appointed to each district, to whom are referred all applications for paving, taking up footpaths, and other matters arising on the same. Their proceedings are, if approved of, confirmed at the general weekly meetings. They have one principal surveyor, a man of great talent, who prepares the plans and specifications, and who has the general management of the constructive part of the sewers. He has under him two assistant-surveyors, whose business it is to see the work properly executed. The Commissioners have also, in addition to the

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necessary staff of treasurer, collectors, and clerks, an able and experienced law clerk, under whose advice they act in all matters connected with his department. The staff is therefore most complete; and if this Board was increased in numbers, as I have before observed, so that they might form sub-committees in the same way that the council do at present; and if, in addition to their present duties, the charge of watching, lighting, and cleansing was added, it would give unity to their proceedings, and there would thus be one vigorous and compact body invested with full powers. Without entering into a particular explanation, it will be obvious that such an amalgamation would be most desirable.

This Commission has rendered essential service by constructing sewers to a great extent, and at this time about two miles of new sewers are being formed. Their average size is 3 feet 9 inches high, and 2 feet 9 inches wide; and their sectional shape is that of the egg, which is undoubtedly the best that can be formed. It is clear that we cannot have a perfect system of *private* till we have a perfect system of *public* sewers; and by reason of the great expense incurred in the latter it must necessarily be a work of time before all can be accomplished. There must be the arteries before we can have free circulation through the veins; and as our river forms a *cloaca maxima,* there is no doubt but when our public sewers are completed throughout the town, the whole filth and *debris* that now poisons the air may be swept away into the great receptacle provided by nature.

Flushing has never yet been attempted in Liverpool; but when the great reservoir is formed on the high level of Everton or Edge Hill, which is about 200 feet above Whitechapel (the lowest part of the town), there will be a sufficient pressure of water to distribute, not only for the purpose of extinguishing fires, but to aid in cleansing out the public sewers. The surveyor has been in London to examine the system so successfully practised there; and I anticipate great advantages from his attention being now specially directed to this important subject. Our town, however, will never be as healthy as it might be until every street has its sewer, and every house and court its branch drain connected with it, all the eyes being trapped to prevent the stench rising up through the street gratings, and every sewer being thoroughly cleansed by washing out. I come now to the subject of private or branch drains, a matter which has been much neglected, but to which the public attention ought to be drawn. As a general principle, these ought to exist in every dwelling, because from every house there is offensive matter which it is desirable to carry off, or which must otherwise assist in tainting the atmosphere by the gases which are evolved during decomposition. These drains need not be either large or expensive; and a drain of six inches diameter will be kept much cleaner than one of a larger bore by the pressure of the water, if it could be had, acting more forcibly

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upon it than upon one of 12 or 18 inches, just as the soil-pipe a water-closet seldom blocks up. If, however, we could have each house a sufficient pressure of water, at an elevation of 20 fe or upwards, to act on larger drains, I should prefer them. I must be observed that the mode of disposing of ashes is differen here from what it is in London. In the latter place they ar removed by the contractors from each parish, while in Liverpool receptacle connected with the privy is appropriated for them and the night soil and that from water-closets is most commonl discharged into these middens. It is obvious, therefore, that a overflow from these receptacles would speedily block up the drain especially if trapped, by the admixture of ashes which would g in; and the private drains, therefore, with us, would be used t convey away the overflow from the dry wells, into which water-closet soil is generally carried, together with the drainage fro sinks and wash-houses. A very cheap drainage tile is manufactured in Staffordshire and in Wales, the latter being the mos durable; and if these were glazed inside the expense of a privat drain from each house would be inconsiderable, and they may b easily constructed so as to be washed out at pleasure. The latte object, I conceive, is indispensable, and the internal glazing woul prevent all adhesion of the passing particles to the sides. Befor quitting the subject, I beg to direct attention to a valuable pape read some time ago to the Polytechnic Society of this town b Mr. Cunningham, an eminent architect, whose scientific acquirements are well known; and although the account is abridged, i contains many matters deserving of attention, and I would recommend its perusal to all who take an interest in the health of ou population.

The last point to which I would direct attention is an adequat and copious supply of water to our large towns. In Liverpool the monopoly enjoyed by our two great water-companies has been, I consider, prejudicial to the health of the community. Whatever is made a matter of sale, presupposes two parties having opposite interests, viz., the seller and the buyer. It is the interest of the former to get the very highest price he can for his commodity; and if there be no other means of supply, and no competition, the buyer is necessarily at his mercy. An understanding between the two companies can of course prevent competition, and consequentl the inhabitants of Liverpool have to pay a price for water whic yields to the original proprietors of the first company, or thei successors, 30 per cent. on the original subscribed capital! and t the proprietors of the second company 19 per cent. This, considering that the shares are marketable, may be right enough, and the proprietors are justified in getting as large a price as they can for their water: but it is a great local misfortune, and i severely felt. We have not in Liverpool a single public fountain, very few troughs for watering cattle, and those only near the docks;

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no stand-pipes for cleansing the footwalks or fronts of our dwellings, nor any reservoir for washing out the public sewers. Water is purchased for nearly all our public buildings, our charitable institutions, and our private dwellings; and its scarcity or price induces many of the poorer classes to obtain it surreptitiously, and consequently irregularly, and thus obtaining it is not considered a crime. No individual possessing a steam-engine, and a constant supply of water from his own well, can sell his surplus water to his neighbour, and the overflows have to be turned into the sewers. Water is as essential to the health and comfort of mankind as the air we breathe; and when mankind congregate in masses, counted only by tens of thousands, it is essential to the public health that it should be most abundant, not doled out to yield to others 30 per cent. interest, but supplied from the public rates and at the net cost. That cost ought only to be the price of raising and distribution; and in this town pure water may be found in every direction, and in superabundance at an average depth of 120 feet. If we had fountains, at once useful and ornamental in every direction, as in most of the cities of the continent, and baths in every locality, so that water was free to all, the benefits would soon be perceived; and I am convinced that if the interest of the two water-companies was purchased by rates levied for the purpose, even at their high premium, the town would soon be the gainer, for it is impossible that the public will much longer be satisfied with the price and comparative scarcity of water, and the power recently obtained to distribute water for extinguishing fires will be sought to be increased; and it will be impossible for Parliament to refuse such extension, unless a very great reduction in the present charges is speedily made. I make these remarks with reluctance, because the enterprise of capitalists at a former period gave to us a supply of water when the public bodies neglected or refused to do so; and they or their successors have an undoubted right to the fruits of their enterprise: but what was once a convenience, has, by the rapid growth of the town, grown into a great inconvenience, the public health demands a remedy. That remedy it will be impossible much longer to defer. I would sum up these few hasty remarks by observing, that Liverpool ought to be one of the most healthy towns in England, from its local advantages and its proximity to the pure sea-breezes. It wants, however, wider thoroughfares, better drainage, both public and private, better cleansing, more attention paid to ventilation, and more water; and until all these are obtained, it will be as wise to look for health in a human being with a narrow and insufficient chest, diseased lungs, constantly inhaling muriatic acid gas, and never being cleansed, as it will be to expect this to be a town celebrated for its healthy condition, while it sets the laws of Nature at defiance, and neglects those means which Nature places at our disposal for the preserva-

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and Government cannot confer a greater boon on our labouring population, especially in large towns, than by reducing the cost of all building materials. What increased comforts to the poor would result from the entire reduction of the duty on bricks, which in this town and neigbourhood does not reach 20,000*l.* a-year! not half the amount chargeable to the parish by the destitution and disease of those hundreds who become a burthen upon it from causes which may be distinctly traced to their wretched habitations, and the destructive habits and crimes which are engendered thereby; and so far as my experience leads me I have invariably found that crime is more or less associated with filth and discomfort: and that invariably the most sober and respectable of our working men enjoy the comfort of a clean and decent habitation. And I am convinced that better ventilation, better drainage, a good supply of water, and that supervision which would result from these objects being generally carried out, would be attended with the happiest results to public morals. At present no officer has any legitimate authority to interfere in promoting or compelling internal cleanliness; but if such was the case, and every large town was divided into districts, a perfect supervision would be obtained, which would act as a preventive of much crime, and would be better than a whole posse of police. Yet, great as are the benefits which would result from cleanliness, it must not be effected at the expense of stability in building, as this is the ground-work on which the superstructure of cleanliness must be raised; and without such ground-work your subsequent operations would be imperfect. All may be done; and I do not think that an additional rent of more than 12*s.* per annum need be made upon a Liverpool cottage, which averages 9*l.* a-year, to remunerate a landlord for such an outlay as will secure the advantages of better ventilation, drainage, and water. The reduction of the duty on bricks would reduce that advance just one-half; and I hope the Government will take this matter into their serious consideration.

"In considering the qualifications that ought to be secured in an officer to regulate local public works, it is obvious that a scientific engineer, who has a good knowledge of architecture, and who, in addition to theoretical attainments, has had practical experience in construction, would be of all men the fittest person to carry out such views as I contemplate. No general Act can by possibility be framed but it will require some adaptation to suit particular localities. Hence arises a difficulty which we experience in our present Building Act. A departure from the strict letter is sometimes an advantage, but the surveyor has no power to remit or to alter, and the magistrate cannot be supposed to be a judge of such matters: we are therefore obliged to conform, although I can often improve. But power must be lodged somewhere, or the Act would be speedily and continually evaded. I apprehend the difficulty may be got over thus:—

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A board of public works should be constituted in the metropolis, at the head of which one of the ministry should be placed. This board should have the nomination of local boards throughout the empire, to be selected from the inhabitants, and they should all consist of an admixture of surveyors, one or two medical men, and a selection from persons, who are known to be well acquainted with the subjects on which they are to legislate. The chairman, in every case, ought to be a magistrate. These local boards should appoint the various surveyors in their own districts, subject to the veto of the metropolitan board: and they should sit weekly, not only to administer in a legislative capacity, but as a board of appeal, possessing power to alter or amend the various details of the Act, according to the requisition or necessity arising from those contingent and local sources, which no general and specific enactment can embrace. The minister of public works, the head of the central board, might have a veto on the proceedings of the local boards, if deemed necessary to prevent tyranny or suppress favouritism. A general surveyor would be necessary in all our large towns, with deputies under him in proportion to the number of dwellings, and the expenses of the officials should be defrayed out of the poor-rates, which would soon be lessened if proper sanatory regulations were enforced. By this means there would be sufficient popular infusion to preserve to every locality a control over its own expenditure, but the pulsation must be given from the centre. There may be doubts whether to give to a central board the nomination of all others, would be consistent with our notions of liberty, because centralization carried out to a great extent has ever been the grave of freedom; but I am convinced that if local boards are to be chosen by popular election, they will be constituted, in the majority of cases, of men utterly incompetent; and noisy demagogues will often be chosen in preference to skilful and experienced, yet retiring men. If therefore the most suitable men are to be obtained, they must be sought out and nominated, and not receive their appointment by popular election. Let the boards be formed of suitable men, and I have no fear of proper and skilful officials being appointed to carry out the sanatory objects which are contemplated.

The last subject to which you direct my attention is that of the best mode of charging old property with the cost of the alterations.

This is probably the most difficult part of the question. The diversity of tenure, the fluctuation in value, the variety of modes of leasing, and the thousand changes which are constantly occurring, render it not only a difficult but a delicate subject to deal with. Simplification must be attended to; for the bulk of mankind do not understand those abstruse calculations which relate to the value of leases at any given period. It appears to me that if Parliament should see fit to pass a general and compulsory

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measure, involving to the owner a present and considerable outlay, he ought to have the means of recovering (during his possession) from the occupant a suitable return for the money he is obliged to expend.

In Liverpool, for instance, about one-third of the whole property is leasehold under the corporation for various terms, but all determinable during the next 75 years. There is scarcely a week but property in a dilapidated condition falls into their hands, and the renewal of leases is continual. In one place I am the possessor of a freehold. Adjoining this freehold I am the possessor of a leasehold for two lives and 21 years. Next to that I have a lease of 72 years; while adjoining me, one of my neighbours has a house which in six years falls into the hands of the corporation, because it is not his intention to renew. When the latter falls into their hands, they will put it up by public auction in its then condition for a further term of 75 years, and they will sell it to the highest bidder. Now it may be just to compel me as the holder of a fee simple to incur an outlay, because I derive perpetual benefit from the improvement, but it will be very unjust to my neighbour (and I have not stated an imaginary case) to compel him to make improvements where he is only a tenant for six years. And so also with the tenant of a freehold, held under lease with a repairing clause, or with a mortgagee obliged to foreclose to enable him to recover. These and numberless other cases environ the subject with considerable difficulties, and while in general terms I think your proposition to spread the charge of permanent improvements over a period coincident with the advantages enjoyed from such works by the generation by whom they are constructed, I must avow myself incompetent to go into the details of such a distinctive and delicate subject, which is, I think, more within the province of the lawyer than the surveyor.

ANSWERS to QUESTIONS contained in a Communication from Dr. LYON PLAYFAIR, respecting the establishment of the BATHS and PUBLIC WASH-HOUSE, by the CORPORATION.

1. How long has it been established?——The wash-house and baths were erected by the corporation at a cost of 2300*l.*, exclusive of land, and were opened to the public on the 1st June, 1842.

2. State in detail, for the last 12 months, the number of people who have had tubs, and the number of dozens of clothes washed?——(See the Report.)

3. The number of baths let of the various kinds for the same period?——(See the Report.)

4. The number of tubs in the establishment, the regulations under which those using them are placed, and the price for use?——There are 26 tubs in the establishment, 21 in the wash-

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Wash-houses and Baths.

house, and 5 in the house for washing infected clothes. (See the rules.)

5. A similar statement in the case of baths, stating also when the price was raised, and for what reason?——There are eight baths in one room, and two private baths.

6. The annual cost of the establishment to the corporation, the annual receipts, and the receipts of baths and tubs separately?——The annual cost of the establishment, 281*l.* 6*s.*; the receipts will be found in the Report.

7. The amount paid to the water-works for water, the number of gallons of water used, and the limitations, if any, as to amount made by the water-works?——The amount paid for water is 52*l.* 10*s.* annually, by contract with the Liverpool and Harrington Water Company; about 1,638,000 gallons in the year, say about 6000 gallons per day during the summer months, and 3000 during the winter months; no limitation as to amount made by the water-works.

8. The class of people who use these baths and tubs, whether they are generally the same, and whether they are neighbours or come from a distance?——The persons who attend the wash-houses are principally from the neighbourhood; the persons who frequent the baths principally come from a distance.

9. State if the number of applicants for baths and tubs is on the increase. With regard to the baths, state if the largest proportion of applicants is male or female, and what proportion of children?——The number is on the increase. The majority of applicants are males, in the proportion of eight to one. The children who attend are about one in eight.

10. What is to be the price of the vapour-baths, and how many are to be made?——The Committee have ordered two vapour-baths to be erected, but the price is not fixed.

Liverpool. — Washhouses and Baths.

FIRST YEAR.				SECOND YEAR.			
Baths.		Total.		Baths.		Total.	
Price of	Description of each.	Nos. of each Bath.	Amount received for each.	Price of	Description of each.	Nos. of each Bath.	Amount received for each.
s. d.			£. s. d.	s. d.			£. s. d.
0 1	Cold	3,762	15 13 6	0 1	Cold	2,796	11 13 0
0 2	Warm	6,757	56 6 2	0 2	Warm	4,236	35 6 0
0 2	Cold	..	..	0 2	Cold	1,858	15 9 8
0 3	Warm	..	..	0 3	Warm	3,751	46 17 9
0 3	Cold	..	..	0 3	Cold	431	5 7 9
0 6	Warm	..	..	0 6	Warm	1,252	31 6 0
0 6	Cold	152	3 16 0	0 6	Cold	187	4 13 6
1 0	Warm	816	40 16 0	1 0	Warm	1,320	66 0 0
0 4	Shower	108	1 16 0	0 4	Shower	144	2 8 0
1 0	Vapour	..	..	1 0	Vapour	201	10 1 0
	Children	66	0 3 8		Children	141	0 7 10
Total Baths each Quarter . . .		11,661	118 11 4	Total Baths		16,323	229 16 6
		16,323	229 16 6	First Year		11,661	118 11 4
Total for the 2 Years		27,984	348 7 10	Increase on 2nd Year		4,662	111 5 2

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Washhouses and Baths.

ACCOUNT of Warehouses from May 25, 1842, to May 25, 1844.

First Year.			Second Year.		
Number of Tubs at 1*d.*	Dozens of Clothes Washed.	Amount Received.	Number of Tubs at 1*d.*	Dozens of Clothes Washed.	Amount Received.
		£. *s.* *d.*			£. *s.* *d.*
9,837	19,261	40 19 9	12,067	25,435	50 5 7
The First Year			9,837	19,261	40 19 9
Increase on Second Year . .			2,230	6,174	9 5 10

INCOME of the Baths and Warehouse.

First Year.			Second Year.		
Amount from Baths.	Amount from Washhouses.	Total Amount.	Amount from Baths.	Amount from Washhouses.	Total Amount.
£. *s.* *d.*	£. *s.* *d.*	£. *s.* *d.*	£. *s.* *d.*	£. *s.* *d.*	£. *s.* *d.*
118 11 4	40 19 9	159 11 1	229 16 6	50 5 7	280 2 1
The First Year			118 11 4	40 19 9	159 11 1
Increase on the Second Year . .			111 5 2	9 5 10	120 11 0
Total Income for the two Years .			348 7 10	91 5 4	439 13 2

WASH-HOUSES AND BATHS.

The monies, as received, to be put by the superintendent, at the time of being received, into a locked box, the key of which shall be kept by the treasurer of the corporation. Counter tickets shall be retained till the parties leave, and then be delivered to the door-keeper.

The money to be paid weekly to the treasurer.

HOURS FOR THE BATHS.

For men	Tuesday Wednesday Saturday Thursday	6 to 9 A.M. 6 to 9 P.M.
For women	Tuesday Wednesday Saturday Friday	10 A.M. to 2 P.M. 4 to 5 P.M.

On Monday, the baths to be shut up till 4 in the evening, for cleaning, which shall be done at the expense of the keeper.

Sunday, only open from 6 till 8 in the morning, from Lady-day to Michaelmas; and 7 till 9 in the morning, from Michaelmas to Lady-day, for men.

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Washhouses and Baths.

The wash-houses to be open all day, from 6 in the morning till 9 at night, and on Saturdays till 10 at night.

Terms.

		s.	d.
Warm baths	each	0	2
Two or three children using the same water		0	2
Cold and shower baths		0	1
Private cold baths		0	6
Private warm baths		1	0

One bath to be reserved for infectious complaints.

The above rates to include the use of one towel.

Persons wanting to bathe to sit down in the waiting room in the order in which they come, and to be served in that order.

All quarrelling and all improper conduct and conversation must be prevented in the baths and in the wash-houses. If any such should take place, the superintendent and matron to have the power of suspending the offender till the next meeting of the Sub-Committee or Committee, and then report.

The bathers to find their own soap, but the institution to find one towel to each bather.

The towels to be washed and dried.

WASHING INFECTED CLOTHES.

A note from any physician or surgeon, parish officer, or visitor of any charitable society, shall entitle a person ill of any infectious complaint to send her clothes, or, if necessary, to have them fetched from her house, and one of the family who is able to assist in the washing should be sent with them.

The note to specify date, name, residence, and disorder, and whether any of the family can assist.

The matron herself must be always present at the opening of the clothes to see them counted by the person bringing them, with the precautions prescribed to her. This is a trust never to be delegated to the persons employed to wash the clothes. The utmost expedition must be used in the washing, thoroughly drying, and returning any clothes belonging to the sick; and if these and the family washing interfere, the sick to have the preference.

A book to be kept in which must be entered the number and kind of pieces received, and a receipt for that number given to the person bringing them, to be produced when they are sent for.

All infected clothes to be immediately put into chloride of lime. Each infected family's clothes to be kept separate from all others. A woman to be hired for washing the infected clothes at 2*s*. per day when needed.

All persons getting their infected clothes washed here, to show that they are taking means to rid themselves of the disorder, by having advice from the dispensary, or some other medical establishment or practitioner.

The owner of the clothes to find soap.

Liverpool.

Washhouses and Baths.

WASH-HOUSES.

Each woman to pay 1*d*., for a length of time not exceeding six hours, for the use of tubs, water, and having her clothes dried. Each woman to have the choice of any tub vacant at the time of her coming; if there is not then room, to be served in the order of application. The matron to decide whose clothes shall go into the boiler together, and to see that each washer puts in a proper proportion of soap and soda; to direct who shall clean out the boiler on clothes being taken out, and to see that it is immediately filled again. Each person to put her small things into the boiler enclosed in a bag.

Great care must be taken that the boiler be not left without water, or it will burn.

The matron to superintend the placing of each person's clothes on the drying horses, and see that they be kept separate; no horse to be drawn out without the matron being present.

When the boiler is not used in the other cellar for the clothes of the sick, it might be used for general purposes, if necessary.

The name and residence of each washer must be entered in a book, and these washers must be divided into "regular" and "accidental."

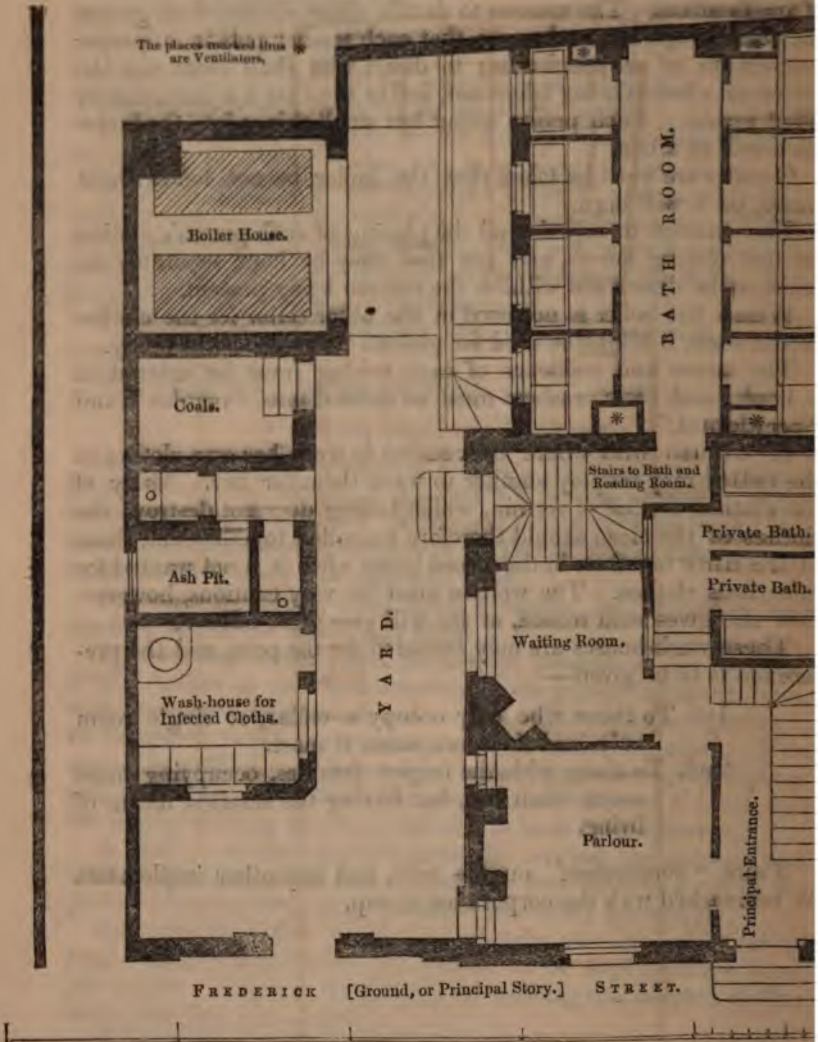
A woman who would be entitled to wash her own clothes in the cellar may employ another to wash them for her. Many of the clothes are full of vermin, which boiling does not destroy; the clothes of the clean should therefore be boiled together, and those of the dirty together, in the second boiler when it is not wanted for infectious clothes. The woman must be very cautious, however, how she gives such reason, or she will give great offence.

These wash-houses are only intended for the poor, and the preference is to be given—

1st. To those who only occupy a cellar, or single room only, and therefore wants it most.
2nd. To those with the largest families, occupying more rooms than one, but having the smallest means of living.

Paint "corporation" on the tubs, and any other implements to be marked with the corporation stamp.

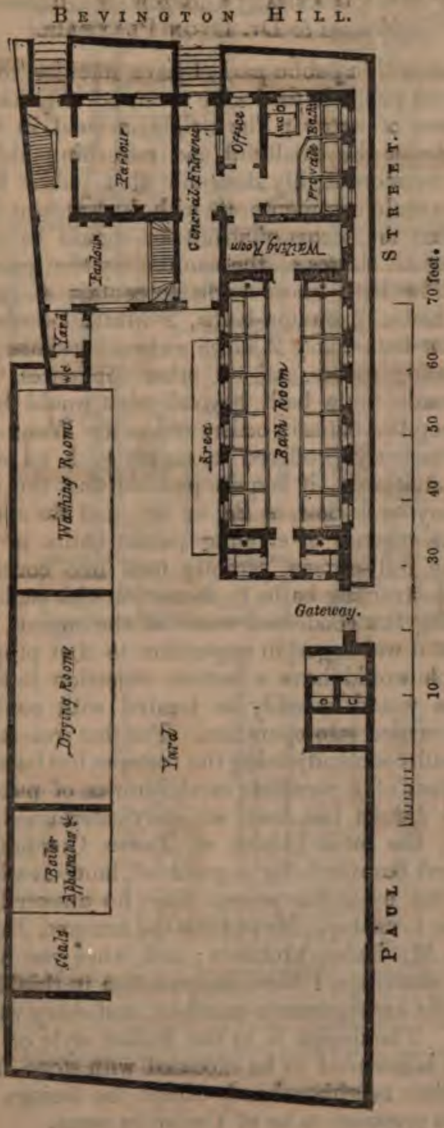
Liverpool.
—
Washhouses and Baths.


The places marked thus ✻ are Ventilators.
Boiler House.
Coals.
Ash Pit.
Wash-house for Infected Cloths.
Y A R D.
B A T H R O O M.
Stairs to Bath and Reading Room.
Private Bath.
Private Bath.
Waiting Room.
Parlour.
Principal Entrance.
FREDERICK [Ground, or Principal Story.] STREET.

PLAN OF BATHS AND WASHING ROOMS, ERECTED IN UPPER FREDERICK STREET

Liverpool.

Washhouses and Baths.



PLAN OF PROPOSED BATHS AND WASHING ROOMS, &c. August 8, 1843.

Extracts from MR. COULTHART'S *Report on Ashton-under-Lyne, addressed to* DR. LYON PLAYFAIR.

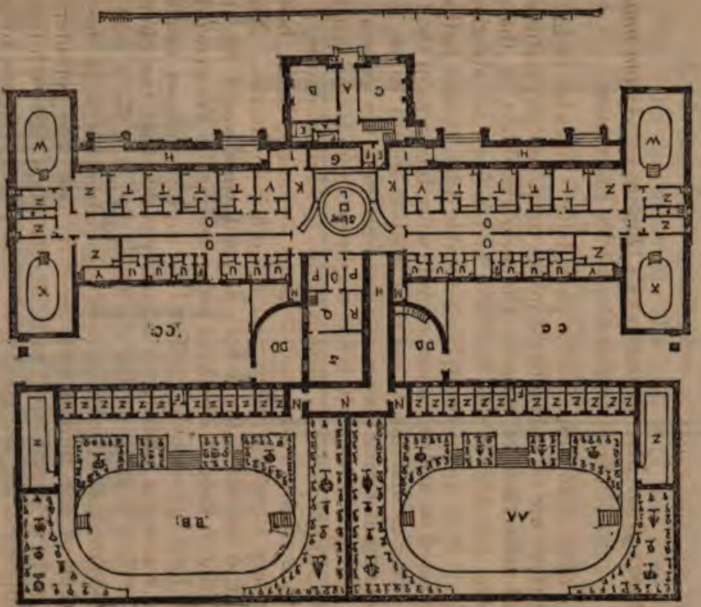
Ashton-under-Lyne.

J. R. Coulthart, Esq.

In connection with a public park, I have likewise to inform you that there are no public baths in the town, nor any natural or artificial collections of water in the neighbourhood, in the remotest degree suitable for the healthful and refreshing ablution of the body. It is therefore highly desirable that public baths should be erected on a scale commensurate with the wants of the town and district, and that the terms of admission should be so low as to promote among all classes of the community the general practice of bathing. The bath house ought to contain at least 16 or 18 warm slipper baths, 2 Buxton-baths, 2 Matlock-baths, 2 shower-baths, 2 sulphur-baths, and 2 large swimming-baths, besides the necessary dressing rooms and all other appliances. No charge ought to be made for a bath beyond what would be absolutely requisite to keep the baths in order, and as the Water-works Company have generously proffered to supply such an establishment with water gratuitously, it is quite possible that the charge for a warm bath may be as low as 2*d.* or 3*d.*, and for a cold one, 1*d.* To obviate the expense of erecting public baths in the town, a number of the mill-owners recently took into consideration the propriety of constructing baths in connection with each factory, and of appropriating the condensed water of the engine, to the use of the baths; but it was urged in opposition to that proposition, that the work-people would have a serious objection to the plan, and that the baths would speedily be treated with contempt if the scheme were carried into operation. For that reason the idea of constructing bath rooms adjoining the factories has been abandoned, and the erection of a complete establishment of public baths for the town and district has been seriously entertained. As a preliminary step, the local Health of Towns Committee recently applied to Lord Stamford for a grant of land on which to erect public baths, but up to the present time no answer has been received from his Lordship. Meanwhile the annexed design has been received from Mr. Bake, architect; and, when you have carefully examined the drawings, I have no hesitation in thinking that you will consider the arrangements excellent, and every way worthy of our adoption. The design is in the Italian style of architecture, and the work is intended to be executed with stone from quarries in the immediate neighbourhood, except the facings and mouldings, which are proposed to be of Yorkshire stone.

Ashton-under-Lyne.

J. R. Coulthart, Esq.

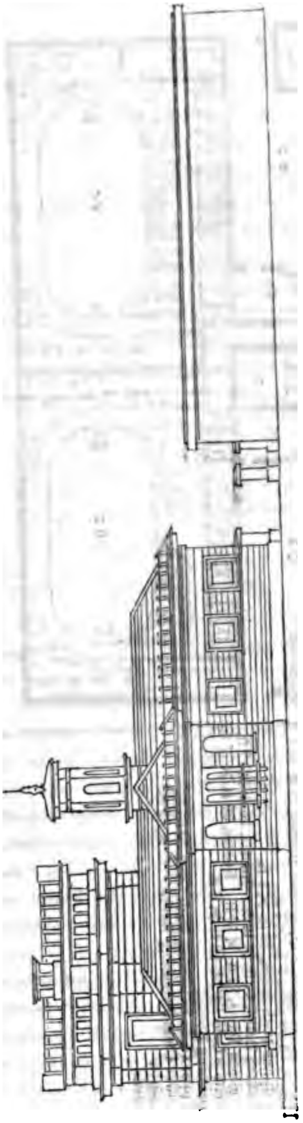


REFERENCES.

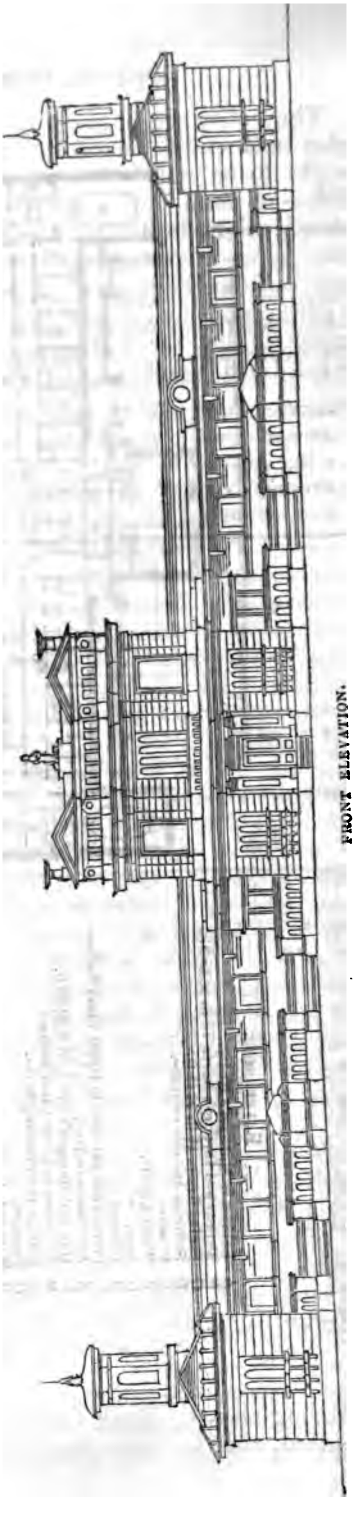
A	Lobbies in Manager's House.
B	Parlour and Director's Room, 16 ft. × 15 ft.
C	Sitting Room, 16 ft. × 15 ft.
D	Staircase and side entrance.
E	Closets.
F	Water Closets.
G	Area.
H	Terraces.
I	Porches and entrance to Upper Class Baths.
K	Ante-rooms in Hall.
L	Hall and Manager's Office, 37 ft. × 26 ft.]
M	Entrances to Lower Class Baths.
N	Passage to Swimming Baths.
O	Passages.
P	Manager's Closets.
Q	Drying Room, 13 ft. × 13 ft., and Boilers underneath.
R	Hot Water reserve, to contain 1000 Gallons.
S	Wash House, 18 ft. × 16 ft.
T	Upper Class Warm Slipper Bath Rooms, 12 ft. × 9 ft.
U	Lower Class ditto, 8 ft. × 7 ft.
V	Sulphur Bath Room, 12 ft. × 9 ft.
W	Buxton Baths, 21 ft. × 10 ft. Rooms, 30 ft. × 17 ft.
X	Matlock Baths, 21 ft. × 10 ft. Rooms, 30 ft. × 17 ft.
Y	Private Cold Baths, 12 ft. × 6 ft.
Z	Dressing Rooms.
A A	Upper Class Swimming Bath, 70 ft. × 35 ft.
B B	Lower Class Swimming Bath, 70 ft. × 35 ft.
C C	Courts.
D D	Yards.

ton-under-Lyne.

Coulthart Esq.



END ELEVATION.



FRONT ELEVATION.

Ashton-under-Lyne.

J. R. Coulthart, Esq.

The entire cost of erecting and fitting up baths according to the plan and specification alluded to, would be about 4500*l.*; but it ought to be stated that an establishment of baths slightly modified in form, and not materially diminished in size from the above, might be built and fitted up for 3000*l.* But as the difference between erecting baths on a convenient and commodious plan, and building them on a small and contracted principle, would be a paltry and injudicious saving to a rich community like this, it is expected that the annexed design will be generally adopted, provided Lord Stamford grants land sufficient for a site.

Table showing the Number of Spindles, Power-looms, and Horses' Power, usually in operation at Ashton-under-Lyne, and at several other Places in the immediate Vicinity; distinguishing also the average Number of Hands employed, the average weekly Wages paid, and the average weekly Amount of Raw Cotton consumed.

Places.	Mule Spindles.	Throstle Spindles.	Power Looms.	Horses' Power.	Hands Employed.	Weekly Wages.	Weekly Consumption of Cotton.
						£.	lbs.
Ashton-under-Lyne .	595,276	9,000	6,738	1,667	10,520	5,775	338,390
Stalybridge . . .	560,844	4,836	5,579	1,509	9,288	5,103	316,776
Dukinfield . . .	178,344	2,592	2,476	521	3,538	1,942	101,316
Hyde	331,202	16,708	7,283	1,212	8,483	4,661	194,823
Mossley	200,396	..	630	444	2,336	1,282	112,210
Total . .	1,866,062	33,136	22,706	5,353	34,165	18,763	1,063,515

It will be found, from the statements in the above table, that the average weekly wages per head is about 10*s.* 11¾*d.*; and I may add that the following wages per week can usually be realized by factory operatives when the mills are running full time, viz., dressers 27*s.*, overlookers 26*s.*, engineers 25*s.*, spinners 22*s.* 6*d.*, warehousemen 15*s.*, twisters-in 14*s.*, weavers 10*s.*, card-room hands 9*s.*, winders 8*s.* 6*d.*, warpers 8*s.* 6*d.*, reelers 8*s.* 6*d.*, big piecers 8*s.* 6*d.*, and little piecers 4*s.* 6*d.*

It will also be seen by the above table that when the factories are fully employed there is a weekly sum of 5775*l.*, or, reckoning 50 weeks to the year, the annual amount of 288,750*l.* paid to the cotton operatives of Ashton-under-Lyne, irrespective of the wages paid to tailors, shoemakers, bricklayers, joiners, and all other handicraftsmen and day-labourers. This is unquestionably a large sum of money, and if a table could be made out exhibiting fully and accurately the various objects upon which it is annually expended, and the relative cost which each object bears to another, it would be a valuable document in your hands or any other gentlemen commissioned to inquire into the sanatory condition of the labouring classes. Such a table, however, I am afraid cannot be compiled, and that an approximation to one of the kind is all that

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can reasonably be expected. Impressed with that opinion I have, with the assistance of a committee of intelligent cotton operatives, drawn up the following table, which will in some degree enable you to form an idea of the way in which the working-classes of this town spend their wages, although its details are not given, and its statements only an approximation to accuracy:—

TABLE showing the Average Annual Amounts expended by the Cotton operatives of Ashton-under-Lyne, in Food, Clothing, Fuel, House Rent, and sundry small items of domestic consumption; also the sums paid annually by the same persons for Education, Ale and Spirits, Medicine and Medical advice; together also with a statement of the aggregate annual amount deposited in the Savings' Bank.

Food.	Clothing.	Fuel.	House Rent.	Sundries.	Education.	Ale and Spirits.	Medicine and Medical Advice.	Savings' Bank.	Total.
£.	£.	£.	£.	£.	£.	£.	£.	£.	£.
185,720	26,410	9,350	33,870	8,180	2,220	14,430	6,160	2,410	288,750

In conclusion, I beg to submit a proximate estimate of the expense of introducing into Ashton-under-Lyne sanatory measures of prevention; and *per contra* a calculation of the pecuniary and other saving that may be expected to arise to the town by the introduction of improvements of the kind. I am the more desirous of bringing under your notice an account of this description from firmly believing in the accuracy of the old adage, that "prevention is better than cure;" and also from knowing that Ashton-under-Lyne possesses within itself all the elements of cleanliness and longevity, and that it only requires the exercise of its own available resources to make it everything that can reasonably be expected from a town population. Before submitting the estimate, however, allow me to notice the data upon which it is founded, as a clear understanding on that head may induce you to attach more weight to my postulates, and greater value to my conclusions, than you might otherwise be inclined to do. It is necessary to premise, however, that although I have included in the estimate the expense of sewering and paving the streets of the town that are at present inefficiently sewered and paved, yet it must be remembered that all owners of property in the town have covenanted with Lord Stamford in their building leases, "to sewer, pave, keep clean, and in good condition," all the streets co-extensive with their premises; and hence if the streets are not sufficiently sewered and paved, the evil is chiefly attributable to the leniency or mistaken views of Lord Stamford's surveyors, and would easily be remedied by a properly qualified public officer

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deciding that additional paving and draining were necessary. Having noticed the circumstance, I now beg to advert to the account itself, which, I need scarcely inform you, is only submitted as an approximation to probable results, and by no means intended to exhibit an accurate statement of future occurrences. Indeed the nature of the account, as you must be aware, precludes the possibility of arriving at anything like demonstration, and more particularly so, that inquiry has not yet established how far sickness and mortality are removable by sanatory means; and of course until that question has been set at rest, any calculations based on an assumed removable amount must, to a certain extent, be susceptible of correction. But to proceed—

The *first* item on the debit side of the proximate account assumes, as you will observe, that there are 700 houses in the town unsupplied with water, and that 12*s*. 6*d*. is about the average expense of bringing water into a cottage. My authority for making these statements is Mr. Henry Hibbert, the Secretary to the Ashton-under-Lyne Waterworks Company.

The *second* item of the proximate estimate, you will also observe, assumes that there are about 3000 houses in the town without a main sewer, and that an expenditure of 1*l*. 6*s*. 8¼*d*. per house would be required to put the whole town in an efficient state of main-drainage. These statements have been made after measuring the unsewered streets, and counting the houses built in them, by means of a map of the town, on which the existing main-sewers are accurately delineated. According to that system of measurement it appeared that there were about 12,320 lineal yards of streets unsupplied with main-sewers, and as I have previously stated that 6*s*. 6*d*. per lineal yard is the general expense of main-sewers in the town, it follows that $12320 \times 6\frac{1}{2} \div 3000 = 26\frac{2080}{3000}$, or 1*l*. 6*s*. 8¼*d*.

The *third* item assumes that there are 3132 houses in the town without proper house-drains, and that an expenditure of capital equal to 15*s*. per house would be requisite to supply the deficiency. These statements are founded on an estimate by Mr. John Wild, who for many years was the principal pavior and culvert sinker of the town, but who has recently retired from the business. Mr. Wild calculates that two-thirds of the houses of the town are without proper drains, and that on the average each house would require a drain 5 yards long and 18 inches diameter, the expense of which for doing a large number would be after the rate of 3*s*. per lineal yard.

The *fourth* item is for paving, and its two assumptions are also founded on an estimate by Mr. John Wild, who, from personal knowledge, calculates that there are about 900 houses in the town in want of paved streets, and that it would require an immediate outlay of not less than 2*l*. 10*s*. per house to remedy the defect.

The *fifth* and most important item on the debtor side of the

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proximate estimate is that for the erection of cheap water-closets in the tenements of the working-classes, with the view of getting rid of the deleterious necessaries I have previously mentioned, and of rendering the cottages of the poor as unobjectionable in that respect as the mansions of the rich. The general adoption of apparatus of the nature of a water-closet would be an immense stride to general cleanliness, and would unquestionably diminish by three-fourths the pernicious exhalations that emanate from all the courts, alleys, and back yards of the town. It would also abolish the obnoxious employment of night-soil collecting, which is not only injurious to the health of the persons engaged in the trade, but is likewise detrimental to the community at large. In order to effect this desirable object at a surmountable cost, I have collected the opinions of the most intelligent and experienced architects and builders within the range of my acquaintance, and the following is a statement of what I consider to be the least expense at which seemly and efficient apparatus of the nature referred to can be erected in Ashton-under-Lyne :—

Calculations of the expense of erecting a cheap Water-closet.

	£.	*s.*	*d.*
To one strong circular fire-clay water-closet basin, 18 inches deep, 12 inches wide at top, 4½ inches wide at bottom, and glazed and smoothed inside with a proper fitting socket-joint.	0	2	6
To one strong fire-clay S soil-pipe, 2 feet long, 4½ inches diameter, with proper fitting socket-joint, and glazed and smoothed inside like the above .	0	1	0
To four yards of fire-clay water-piping, 4½ inches diameter, glazed and smoothed inside like the above, with proper fitting socket-joints, at the rate of 1*s.* per yard	0	4	0
To five yards of half-inch patent lead service piping, at 1*s.* 4*d.* per yard	0	6	8
To one newly-invented economic water-tap (estimated at)	0	6	0
To Mr. William Briscoe's estimate for erecting and fitting up the apparatus, including, among other things, the joining and laying of the pipes, repaving the street, covering and casing the closet in a handsome manner with inch board, and finding all necessary cement, hinges, nails, &c.	0	15	0
	1	15	2
Five per cent. off for large numbers	0	1	9
	1	13	5

The above would be the expense of fitting up a closet on the ground floor, but an additional charge of 12*s.* would be requisite

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for fitting one up on the bulk-head in the chamber story in consequence of the extra length of fire-clay and lead service piping that would be required. It is worthy of observation, that the fire-clay pipes mentioned above are three-quarters of an inch in thickness, exceedingly strong in texture, and by no means brittle like earthenware. Indeed, I could not be convinced of their great strength, nor of their adaptation to the purpose required, until I had seen them manufactured, broke two or three of them with a hammer, ascertained that considerable quantities of them are used for gentlemen's water-closets, and established that in all cases they answer exceedingly well. In fact, the cohesion of the parts of well-burned fire-clay is wonderful; and in that respect it approaches cast iron in a much closer degree than could possibly be supposed in an argillaceous substance. I have, therefore, no hesitation whatever in recommending fire-clay pipes to your notice; and, as they are bent into any shape with the greatest ease when in the doughy state, no additional charge is made for manufacturing them to suit particular curves and angles.

The sixth and last item on the debtor side of the estimate is that for fixing ventilators in the upper portions of existing rooms, whereby a current of fresh air would be created with the external atmosphere through the medium of the chimney flue. If this simple plan were invariably adopted, I have no hesitation in saying that the excessively unwholesome smells in many of the sleeping apartments of the labouring classes would be essentially lessened; that sickness of a typhoid description would be greatly diminished, and that vigour of body and mind would be materially promoted. I verily believe that there is scarcely any external circumstance more destructive of robust health than imperfect ventilation; and yet its effects are so insidious that thousands of excellent constitutions are completely ruined by it long before the unhappy patients are sensible of the danger. It is, therefore, of the utmost importance that ventilation should receive mature consideration, and that it should be carefully provided for in any measure that may be brought forward for the promotion of public health. So long, however, as the smoke of our factory chimneys remains unconsumed, and large quantities of soot and small coal enter our dwelling-houses whenever the doors or windows are opened, I am afraid that ventilation can only be partially effective in Ashton-under-Lyne.

The following plan, which I now respectfully submit for your consideration, would, in my opinion, materially diminish the evil; and the cheapness and simplicity of the method are important recommendations. The plan wholly consists in making an opening into the flue at the top of the chimney breast, and fixing therein a bill-mouthed iron tube, 12 inches diameter at the lower orifice, which, after communicating with the chimney flue, extends in a vertical direction for about 15 inches, and then terminates in a

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contracted aperture of about 3 inches diameter. This kind of ventilator is sometimes used in public-houses for clearing rooms of tobacco-smoke; but it is obvious that, if the plan is found effectual in doing that, it must also be efficacious in disengaging impure air from imperfectly ventilated sleeping apartments. The entire cost of the tube and fixing would not exceed 4*s.*; and, as three ventilators, on the average, would be sufficient for each house, the expense of ventilating the whole town on that principle would not exceed the sum stated in the proximate estimate. Perhaps the most effectual method, however, of ventilating dwelling-houses would be by constructing a separate ventilation flue at the time of erecting the house; but as that regulation could only apply to future buildings, it is scarcely worth while alluding to it in regard to existing tenements.

Having thus shortly noticed the *data* upon which the conclusions on the debit side of the estimate are founded, permit me to draw your attention to the credit side of the account, whilst I point out to you as briefly as I can the principle upon which I calculate that there would be a pecuniary saving to the town, if sanatory measures were introduced.

1st. In the first place, then, the positive number of deaths annually in the town is 699, or 3·2 per cent. per annum of the population; whilst in 1838-9 the mean annual rate of mortality of England and Wales was only 2·1, or about two-thirds that of Ashton-under-Lyne. I therefore calculate that the introduction of sanatory measures would reduce the average mortality of the town to that of England and Wales, and would consequently reduce the positive annual number of deaths from 699 to 466, thereby saving the lives of 233 persons annually, and the pecuniary expense attending their interment. Through the industry of Edwin Chadwick, Esq., the talented Secretary to the Poor Law Commissioners, it has been ascertained that the average cost of funerals of persons of every rank above paupers in Great Britain is 14*l.* 19*s.* 9*d.*, and that the average expense of funerals among the working classes is 5*l.* Assuming, then, that the whole of the 233 lives annually saved by sanatory means would be of the labouring class, and that the average cost of interment would not exceed 5*l.*, it follows that 233 × 5 = 1165, the sum stated in the estimate.

2nd. In estimating the amount of the pecuniary saving that may reasonably be expected to arise to the town by the introduction of sanatory measures, the saving in the expense of 1 in 44 of the population ought not to be omitted, as you are aware that observation has fully established that births increase and diminish in proportion as mortality increases and diminishes; and that a diminution of the rate of mortality in any given town, county, or nation, is quickly succeeded by a reduction in the number of births, and *vice versâ*. This law of population justifies me in calculating, as I have done, that the number of births in Ashton-under-Lyne would be reduced, by sanatory means, from the present annual number of 825, or 1 in 27 of the population, to 516, or 1 in 44, as in the county of Hereford; and estimating the average expense of each birth at only 25*s*., it follows that $825 - 516 \times 1\frac{1}{4} = 386\frac{1}{4}$, or 386*l*. 5*s*., as stated in the account.

3rd. In computing the saving from reduced sickness, I have proceeded on the principle that disease will diminish in the same ratio as mortality, namely, one-third; and in determining the amount of illness in the town, I have taken the sickness returned by the Boards of Health as the basis of calculation. The returns alluded to show that nearly one-fourth of the entire population are subscribers to these associations; that for every 100 members there are annually 118 distinct cases of illness; and that the average duration of illness is four days. Taking these statements as criteria by which to estimate the aggregate number of cases of sickness in the town, it will be seen that there are annually 26,780 of four days' duration; and reckoning on the average 4*s*. per case for lost labour, 2*s*. 6*d*. per case for medicine and medical attendance, and 8928 as the positive number of cases diminished by sanatory means, the sum under this head in the proximate estimate will be found in this manner, viz., $8928 \times 6\frac{1}{2} \div 20 = 2901\frac{12}{20}$, or 2901*l*. 12*s*.

4th. The *data* for calculating the saving in respect of widowhood and orphanage have been obtained from Mr. Enoch Turner, the assistant-overseer of the town and parish. According to that gentleman's returns, there are on the average 118 cases of widowhood and orphanage dependent upon the poor-rates; and if we estimate the expense of each case at 10*l*. per annum, and that sanatory measures would diminish the number by one-half, it follows that the saving is $[118 - 59 \times 10 = 590]$ 590*l*.

5th. In noticing the last item of the estimate, I have to observe that the saving to the town in respect of life assurance is calculated on the principle that the average duration of life will be extended from 17 to 23 years, and that consequently the mean expectation of life will be as great, *ceteris paribus*, at the age of 23, under improved regulations, as at 17 under existing circumstances; thereby diminishing the risk of death, and (according to the tables of the Scottish Widows' Fund Life Assurance Society) saving annually 5*s*. 7*d*. per cent. premium on all policies for the whole period of life. Of course, such a reduction in the rate of assurance can only be expected to occur when the extension of life alluded to has become general, and been satisfactorily established. I find by personal inquiry at the principal life-assurance offices in Ashton-under-Lyne, that the aggregate amount of sums assured by life policies in the town exceeds 110,000*l*., and taking 5*s*. 7*d*. per cent. as the average annual saving in premium, it results that the saving annually would be 307*l*. 1*s*. 8*d*.

The estimate referred to is as follows:—

Ashton-under-Lyne. — J. R. Coulthart, Esq.

Proximate Estimate of the Expenditure necessary for introducing into Ashton-under-Lyne Sanatory Improvements.

—	Total Number of Houses.	Cost per House for Capital.			Rent per House.			Total Outlay.			Total Increased Rental required for the District Improved, defraying by Annual Instalments of Principal & Interest of 20 Years for the Paving, House Cleansing, and Water Apparatus; and 30 Years for Main Sewers and House Drains.		
		£.	s.	d.	£.	s.	d.	£.	s.	d.	£.	s.	d.
1st. In want of water laid on in the house .	700	0	12	6	0	0	7½	437	10	0	33	7	3
2nd. In want of main sewer	3,000	1	6	8¼	0	1	4	4,003	2	6	237	16	2
3rd. In want of house drains	3,132	0	15	0	0	0	9	2,349	0	0	139	10	9
4th. In want of paved street	900	2	10	0	0	2	6	2,250	0	0	171	11	3
5th. In want of apparatus of the nature of a water-closet . .	4,650	2	5	5	0	2	3¼	10,559	7	6	805	2	7
6th. In want of ventilation by openings in the superior portions of existing rooms	4,700	0	12	0	0	0	7¼	2,820	0	0	215	0	6

	£.	s.	d.
Total immediate expenditure of capital required for the improvement of the town	22,419	0	0
Total increased rental required for the improvement of the town	1,602	8	6
Immediate expenditure for each house in want of all the appliances	8	1	7
Total increased rent for each house in want of all the appliances	0	8	1
Immediate expenditure per head on the population .	0	19	9
Weekly rents per head on the population	0	0	0¼ $\frac{9583}{22700}$

Besides the improvements mentioned in the preceding table, there is also to be taken into consideration the expense of erecting public baths and making a new road round the moss. Several influential gentlemen of the town think that the expense of these objects ought to be defrayed by a rate, and if such should prove to be the general opinion, the following will be a statement of the account:—

	£.	s.	d.
To erecting and fitting up public baths, according to a design	4500	0	0
To making a new road round Ashton-under-Lyne Moss, according to plan and specification previously given	912	0	0
	5412	0	0

Ashton-under-Lyne.

J. R. Coulthart, Esq.

	£. s. d.
By rate of 2*s*. 6*d*. in the pound on 44,877*l*., being the net rateable annual value of the property of the town	5519 12 6
Leaving for the expense of collection, &c., a balance of	£107 12 6

PROXIMATE ESTIMATE of the Pecuniary and other Saving that may be expected to accrue to Ashton-under-Lyne from Sanatory Improvements.

1. Saving by One-third of the Positive Number of Deaths, the Expense of each Death being Estimated at £5.	2. Saving in the Excess of Births beyond 1 in 44 of the Population, the Expense of each Birth being Estimated at 25*s*.	3. Saving in Days' Labour, and in a Reduction by One-third of the Cases and Expense of Sickness, Computing the Saving at 6*s*. 6*d*. per Case.	4. Reduction by One-half of the Existing Number of Cases of Widowhood and Orphanage Dependent upon the Poor's Rates, taking the Expense of each Case to Cost £10 per Annum.	5. Saving in the Risk of Death, and consequent Expense of Assurance, by extending the Average Duration of Life from 17 to 28 Years, estimating the Aggregate Amount of Life Policies in the Town at £110,000, and the Reduction of the Annual Premium at 5*s*. 7*d*. per Cent.
£. *s*. *d*.	£. *s*. *d*.	£. *s*. *d*.	£. *s*. *d*.	£. *s*. *d*.
1,165 0 0	386 5 0	2,901 12 0	590 0 0	307 1 8

	£.	*s*.	*d*.
Total annual saving to the town, which may be considered a set-off to the total increased rental *per contra* . . .	5,349	18	8
Total weekly saving of money to the town	102	17	8
Total annual saving of money to each house in the town .	1	2	9
Total weekly saving of money to each house in the town .	0	0	5¼
Total saving of money per head per annum to each individual of the population	0	4	8½
Total saving per week in money to every individual in the town	0	0	1 1/13

But if instead of paying off the whole of this sum in one year, it was repaid, with interest at the rate of five per cent. per annum, in 30 years, an annual rate of 1¾*d*. in the pound would only be required, which would be sufficient to raise the necessary sum, viz., 325*l*. 6*s*. 6*d*.

In closing this letter, allow me to remark, that in all the statements I have made I have endeavoured to be critically correct, and in every instance I have been at great pains in verifying my assertions. It is not impossible, however, but that errors may exist, after all the care I have taken to avoid them; but I feel confident that their number, if any, must be exceedingly small, and that their deviations from accuracy must be of trifling importance.

Trusting that this communication will, in some degree, promote the object of your inquiry, and that Ashton-under-Lyne will not be overlooked or forgotten when sanatory measures of improvement are introduced into populous districts by the Legislature.

Nottingham,
—
T. Hawksley, Esq.

TOWN OF NOTTINGHAM.

Number of Acres.	Population.		Number of Houses.			
	1831	1841	1831		1841	
			Inhabited.	Uninhabited.	Inhabited.	Uninhabited.
2,610	50,680	53,091	10,407	435	10,934	678

[Extracted from the Tables of the Registrar-General.]

-	Deaths of Persons in 1841.		Deaths of Persons in 1840, 1841, and 1842.			
Population in 1841.	Total Number whose Deaths were Registered.	Under Five Years of Age.	Total Number whose Deaths were Registered.	Mortality per Cent.	Number of Deaths which would have happened if the Mortality had been 2 per Cent.	Excess of Deaths above the Average of 2 per Cent.
53,080	1,239	565	4,462	2·8	3,185	1,277

Replies to the Queries issued by Her Majesty's Commissioners for inquiring into the present State of Large Towns, &c. With additional Observations in Answer to the further Inquiries of JAMES RANALD MARTIN, Esq., *one of the said Commissioners.*

By T. HAWKSLEY, C.E., M.I.C.E.

1. The town of Nottingham is in latitude 52° 57′ North, longitude 1° 8′ West. It is for the most part placed at a considerable elevation above the country surrounding it on the southern, eastern, and western sides. Its site is on the declivity of the southern termination of a long range of hills of considerable elevation, and its aspect is consequently very decidedly southerly. The valley of the Trent, about one mile in width, lies at its foot.

The following pen-sketch (p. 2.), which is intended to exhibit an approximate vertical section of the Borough of Nottingham, will probably convey a more correct idea of the position of the town with respect to the adjacent country, and of the relative levels of the upper and lower districts into which it is naturally divided by an extensive geological disruption, than could possibly be obtained from any written description, however minute.

2. Three-fourths of the town is based immediately on the new red sandstone rock, which is exceedingly dry and absorbent. This portion is elevated from 50 to 200 feet above the adjacent valley of the Trent, and comprises the best and most respectably inhabited part of the town, together with numerous densely-populated places of very inferior description, inhabited by the working classes. The remaining portion stands on an alluvial deposit of gravel, sand, "silt," and decayed vegetable matter, and is principally situated in the valley of the Trent, or in the valleys of streams communicating with that river. The soil of this portion is damp, and the situation moist and unhealthy. The substratum is invariably sandstone.

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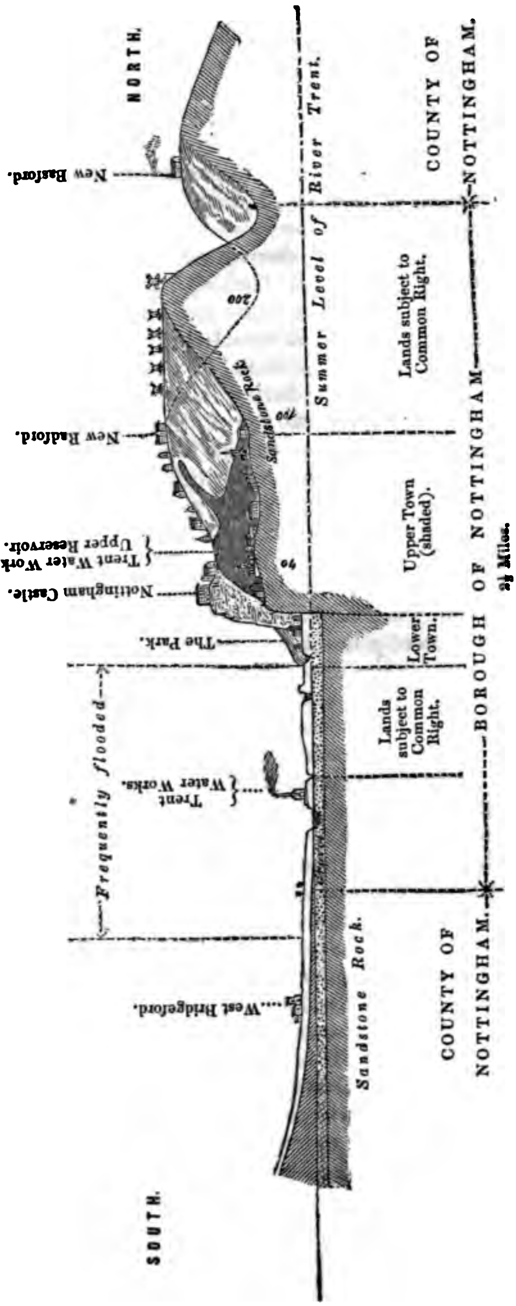

The natural facilities for drainage are exceedingly good, as

Nottingham.
—
T. Hawksley,
Esq.

the town stands, with trifling exceptions, upon inclined ground rising 196 feet in little more than one mile. The waters are received and carried off by the river Leen on the south, and its tributary the river Beck on the east. These streams, after uniting, discharge themselves into the river Trent, about three-fourths of a mile south of the town.

There are no insurmountable impediments to efficient *surface* drainage by sewers, even in the lowest parts of the town. The drainage of *cellars* and *sub-stories* is, however, in some few situations impracticable, especially during the not infrequent occurrence of floods from the Trent, which "tail-up" the sewers in such situations.

3. No part of the town is *now* liable to be flooded by the rising of the river Trent; but some of the lower portions suffer from accumulations of water during heavy rains, in consequence of the inadequacy of the sewerage to the conduct of the waters of rain-storms; Poplar-place, Narrow-marsh, and the Meadow-plats, or some portions of them, are thus affected.

4. There are no obstructions to the natural drainage incapable of remedy by deepening the outfalls of the rivers, by enlarging and otherwise improving the sewers, and by forming better communications with the streams than at present exist, except, perhaps, the one obstruction occasioned by arching in on a very contracted scale, and subsequently building over, the river Beck. This important obstruction is the result of a long-continued neglect of the authorities formerly charged with the maintenance of the drainage, and is of a kind which could not have occurred under public management of the most moderate efficiency. A portion of the adjacent country is now drained chiefly by absorption, but, in the event of an extension of the town, would obviously discharge a greatly increased proportion of its waters into the natural valley of the river Beck. The diameter of the river Beck sewer is only from four feet to four feet and a-half, while the surface of the district likely to be ultimately affected is little less than three square miles.

5. There is no public survey whatever, nor do any regulations exist with respect to new buildings.

6. In the principal portion of the town the natural inclination of the streets is very considerable, there is therefore no stagnant moisture in them. Many of the courts and alleys adjoining these streets are however indifferently drained, some indeed not at all; these are therefore liable "to the retention of stagnant moisture." The very ample supply of water afforded by the two incorporated Water Companies occasions the moisture to be frequently changed, and therefore prevents many of the ill consequences which would arise from the putrefaction of the organic matters contained therein. Many of the streets in the inferior parts of the town are neither paved nor drained in consequence of the indisposition of the Boards of Highways to accept these streets as public roads, notwithstanding the inhabitants are assessed and compelled to con-

tribute to the repair of the highways in the same proportion as persons residing in adopted streets.

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Accumulations of filth and moisture, attended with the worst and most fatal consequences, have repeatedly occurred in several of the courts of this town. Cabbage-court in Charlotte-street, (an elevated portion of the town,) and Morley's Yard on Leen Side, (a low part of the town,) may be particularly instanced amongst many other places of only somewhat inferior notoriety. In these the most malignant and fatal diseases are generated and matured, and hence they spread themselves to the danger and detriment of the whole community.

There are very few stagnant pools in the neighbourhood of Nottingham. In the cavities created by the formation of streets in the ground called the West Croft, enclosed by the Corporation in the year 1839, water occasionally accumulates under circumstances the most favourable for the generation of malaria, and produces at times an effluvium exceedingly offensive. These cavities are only 200 or 300 yards from a populous part of the town.

7. Sewers have been formed to a very considerable extent; they are however, in general, very defective and unsystematic. A great number are indeed so shallow as to be incapable of effecting more than surface drainage, and but few are laid sufficiently deep to effect the thorough drainage of basement stories. The sewers in the natural valleys have been constructed without reference to future wants, and are not sufficiently capacious to effect the drainage of the town when it shall be hereafter extended; the sewer formed on the course of the River Beck is even now incapable of conveying the waters of heavy rains, and has therefore occasioned the houses in its vicinity to suffer from inundation when these have occurred. Very many streets have as yet no public sewers or other sufficient means of under-ground drainage. For instance, the whole or considerable portions of each of the following streets:—

Lamb-lane.
Sherwood-lane.
Rumford-street and four or five adjacent streets.
Twenty or thirty streets in the Meadow-plats.
Eight or ten streets near Pierrepont-street.
Back-lane.
Clinton-street and several adjacent streets.
Chesterfield-street and five or six streets adjacent.
Newcastle-street.
Clare-street.
Parts of Narrow Marsh, &c. &c.

and numerous blocks of buildings containing 1000 to 3000 inhabitants, all rated to the maintenance and repair of the highways of the town. In general, where there are sewers, there are also branch drains from the houses abutting on the streets; many of the courts are however still drained into the gutters of the streets by open channels.

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8. The smaller houses (of which there are about 8000 out of 11,000 under 10*l*. per annum rent) are not provided with proper necessaries. One necessary to three or four houses, or to 15 or 20 inhabitants, is very general under the more favourable circumstances; frequently there is not more than one to five or six houses, and in some instances to 8 or 10 houses. The necessaries are mostly placed in clusters of two, three, four, five, or six, with one dirt-pit to the whole, the doors close to each other, the partition-walls 4½ inches thick, frequently more or less open beneath the seats, commonly erected under dwellings in which whole families live and sleep, and nearly always exposed to the direct gaze of the inhabitants of the streets, courts, and places in which they are situated. These mal-arrangements militate most grossly against the comfort, decency, morality, and health of the labouring population of the town.

In the better parts of the town there are many water-closets supplied by the Water Companies, for the exceedingly moderate annual charge of 10*s*. each. These, for the most part, now discharge into the public sewers, though in opposition to an antiquated regulation of the Highway Board to the contrary. Many of the superior houses have privies in their back-yards, situated under immediate view from the dwelling-rooms of the occupants of the houses to which they are appended, and very frequently within the observation of the occupants of the adjoining houses also. This defect arises from the exceedingly crowded state of the town, and is obviously productive of numerous evil consequences, amongst the least of which may be mentioned the injury to the animal functions from retention, while waiting an unobserved opportunity to obey the calls of nature. It is perfectly well known that, in Nottingham, females suffer much in consequence of the indelicacy of the existing arrangements. A personal examination of the dwellings in all parts of the town will however do more to inform the Commissioners of the defective structural arrangements of its buildings, than the most elaborately written description.*

There are no public necessaries except, I believe, one recently erected by the Corporation in the Meat-market. Through this a stream of water is frequently passed. There is also one public urinal connected with the Town Hall, which, though in a very public situation, is usually suffered to remain in the most filthy and neglected condition.

9. The supply of water being good, the house drains are generally clean, and of course are seldom choked by accumulations of deposited matter. Offensive effluvia are sometimes emitted from them when not properly and effectually trapped and substantially built. This defect is, however, entirely the fault of the owner or occupier, as no local authority has any control over those portions of the drains which lie beyond the boundary of the public street.

10. Where the ground is inclined the sewage is rarely obstructed,

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* This examination has since been made.

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but where the ground is level, accumulations, consisting principally of sand from the soil of the town, mixed with animal and vegetable matters, occasionally occur. About 12 of the inlet shoots are effectually trapped; the others, which are very numerous, frequently emit most noisome stenches. No means are employed to *prevent* accumulations. When stoppages happen, the sewer or pit (as the case may be) is opened under the direction of the officer of the Board of Highways; the obstructing matter is then raised to the surface of the street, and is afterwards carted away.

11. With respect to the original construction and subsequent maintenance and repair of the sewers and drains no local regulations of a systematic character are in force.

12. In those streets in which sewers have been constructed, the liquid refuse is, for the most part, carried off by them; but in undrained and unpaved streets the liquid refuse partly soaks into the soil, partly evaporates, and is partly carried off by rain and the water supplied by the public Companies into other streets where sewers exist.

13. The section of the street sewers is generally circular. They are mostly half a brick (4½ inches) thick, the lower half laid "dry," and the upper built with mortar. They are chiefly 2 feet and 2 feet 6 inches diameter, very few being larger, but some smaller. The cost (including excavation to a depth of 6 feet, and radiating bricks) is about 3*d*. or 3½*d*. per inch diameter.

The rivers Leen and Beck are both arched over, and are, in many cases, built upon. The British and Foreign School, a considerable building in Canal-street, in which a numerous body of children receives education is actually built upon the arch of the Leen, the principal and the foulest sewer of the town. One sewer, (elliptical in section,) near 400 yards long, about 4½ feet high and 3 feet wide, passes down Lister Gate and Carrington-street; this is laid at considerable depth, and is the best constructed and most efficient sewer in the town.

14. The public sewers are cleansed, as already stated, by opening the ground from the surface of the street, breaking through the brickwork, and digging out the accumulated matters, but the annual expenditure consequent on this operation has not been ascertained.

15. There is no regular service of scavengers. Only a few of the streets are swept, and those at very uncertain periods. The streets inhabited by the poorest classes are seldom or never cleansed at the public expense, although it is beyond doubt that a minute attention on the part of the public authorities to the health and comfort of the labouring population would result in a large economy of the public expenses consequent on the existing amount of sickness and premature mortality.

16. The refuse of the courts and alleys is reserved in the necessary-pits till the accumulation is very considerable, the inhabitants then sell it to "muck-majors," (as the dealers in excrementitious manures are here denominated,) for a few shillings per load, and

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divide the amount so obtained amongst themselves. The refuse is carted away by the purchaser during the night, and not later than seven o'clock of the morning in summer, and nine in winter. This regulation is imposed by a bye-law of the corporation. The carts frequently let fall a portion of their semi-fluid contents in the public streets, notwithstanding a regulation exists to the contrary. The penalty attached to the neglect of the regulation is however rarely inflicted, and of course the regulation itself is only imperfectly operative.

17. Dust-bins are not very general. The privy-pit is the usual receptacle for every description of refuse.

18. The purchased refuse is partly carted directly away to the country, and is partly deposited upon two or three wharfs, situated on the side of the canal, but surrounded by densely-populated neighbourhoods, to which they are of course a nuisance. In the vicinity of one of these wharfs fevers and other contagious diseases are exceedingly prevalent.

19. A Court Leet is annually held under authority of the Corporation as lord of the manor. This Court professes to take cognizance of and have authority in particular cases of nuisances, and to be able to impose fines upon certain descriptions of wrong-doers. It is, however, almost needless to say that, in common with other similar feudal Courts, this either does not possess the powers it claims to be invested with, or is incapable of asserting any extensive or generally useful authority. Small fines are exacted for certain classes of nuisances and encroachments, which may then remain undisturbed, so far as the Court is concerned, till the next annual perambulation, when the fine is again imposed. These fines are collected when the parties are willing to pay them, but are rarely enforced when a disposition to determined resistance is manifested. When the Court acts it is by the rule of *might*,—it receives no evidence, hears no arguments, nor carries in any of its proceedings the most remote resemblance to a legally constituted and competent tribunal. In fact, it claims to be judge, jury, advocate, witness, and prosecutor. This is the only body which asserts to have any special local authority of a sanatory nature. There is therefore no local authority vested with *adequate* powers (and of course there is no authority *responsible*) for the enforcement of cleansing or other sanatory regulations in this town.

20. With few exceptions the houses of Nottingham and its vicinity are laid out either in narrow streets, or more commonly are built in confined courts and alleys, the entrance to which is usually through a tunnel from 30 to 36 inches wide, about 8 feet high, and from 25 to 30 feet long, so that purification by the direct action of the air and solar light is in the great majority of these cases perfectly impracticable. Upwards of 7000 houses are erected *back to back and side to side,* and are of course by this injurious arrangement deprived of the means of adequate ventilation and decent privacy. Some idea of the extraordinary density occa-

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sioned by this arrangement may be inferred from the fact, that in one quarter of the town, of which an account was some time since taken by Mr. Barnett, the clerk of the Nottingham Union, more than 4200 people were ascertained to dwell in a square of less than 220 yards on the side.

The courts are almost uniformly *closed at* BOTH *ends*, being entered by the tunnel already spoken of, and no arrangements exist for cleansing or even viewing them.

21. The cellar dwellings are not numerous, being probably under 200; they are mostly situated below the "back-to-back" houses, of which they form the sub-story. They are lighted from an area of perhaps four or five feet wide, are not drained, and are only ventilated by the door, window, and chimney. The occupants are, as might be anticipated, almost invariably squalid and sickly.

22. There is no local Act to prevent any owner doing exactly as he thinks proper with his own land, or with any buildings thereon. Every proposition for a General Improvement Act has hitherto been successfully withstood by small house-owners and other interested parties. The lands surrounding the town being subject to right of common during a portion of the year, oppose an effectual barrier to extension or other improvement for the relief of the numerous over-crowded districts above referred to.

23. The school-rooms are, with few exceptions, bad as regards site, light, height, and ventilation. Warmth is in most cases afforded by open fire-places, and is not distributed with sufficient equality. There are "necessaries" to all the schools I have visited, but not such as would be implied by the word "proper," used in the query. I do not bear in mind any public school with a play-ground attached. I think only two private schools have play-grounds annexed, and these grounds are of inconsiderable size.

St. Mary's Girls' School (recently erected) is, from want of available land, built in the corner of a crowded burial-ground, immediately fronting another similar place of interment, and alongside an alley, till recently, if not now, in the occupation of the lowest characters. The British and Foreign Boys' and Girls' School is, for the same reason, built on a public sewer, and the structure is at the present time sinking in consequence. The Boys' National School is in one of the most degraded and vicious neighbourhoods, a neighbourhood in which moral precept is more than likely to be counteracted by immoral example. To these important schools the public street is the only play-ground. The Free Grammar School, the Blue-coat School, the Lancastrian School, and many other schools, though better situated, have no better accommodation. I believe the drainage is generally good.

24. With respect to open spaces, Nottingham is very peculiarly circumstanced. The town is nearly surrounded by lands more or less open during certain periods of the year, but only for the purpose of exercising the legal right of common thereon. The public, and especially the juvenile portion, does however trespass

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to a great extent upon these lands while thrown open, i. e., for about three months in the year (August to November); for although the meadows remain open for a somewhat longer period, they are too damp after the early part of October to be then advantageously used for the purposes of recreation and exercise.

At a distance northward of nearly a mile from the centre of the town is a plot of land containing 124 acres, called the Nottingham Forest, being an unstinted common, the soil of which is claimed by the corporation as lord of the manor. This is open during the whole year, and is partly applied as a cricket-ground, an exercising ground for the military, and a race-ground, and partly remains an unreclaimed waste.

Still further to the north, about two miles from the market-place, and therefore at a distance too remote for convenient recreation, is another portion of common, containing 57 acres, called Mapperley Plain, of similar tenure to the Forest. The partial cultivation of this common has ceased in consequence of the objections raised by the freemen.

There are no public parks, gardens, or walks, appurtenant to or maintained at the expense of the town. If, however, the two inconveniently situated commons, which contain together upwards of 180 acres, could be enclosed and sold, and the proceeds be applied in the purchase, construction, and maintenance of well laid out walks and gardens in the immediate vicinity of the town, ample spaces might be obtained, and great sanatory advantages would result therefrom.

25. There are no proper open bathing-places. The Trent is frequented during the hot weather, but neither very decently nor very safely. There have been about 50 cases of death by drowning in the Trent during the last few years. There are no public baths, unless a bath, the property of an individual, to which the subscription is 25*s.* per annum, and a bath constructed by a mill-owner, for each use of which a charge of 6*d.* is made, can be so denominated. Various projectors have at different times brought forward schemes for the construction of public baths on the banks of the Trent. My own observation convinces me that a habit of bathing for corporeal purification cannot be induced nor will be likely to be persevered in unless the baths be erected in the immediate vicinity of the dwellings of the classes by whom they are intended to be used, and the water be raised to the temperature necessary for personal enjoyment.

26. The town and suburbs are supplied with water for domestic use from the works of two companies, established by Acts of Parliament, and by two or three minor works, the property of private individuals, constructed for the special supply of very elevated places.

The oldest company is the Nottingham Old Water Company, which commenced its operations about 150 years ago, but was not incorporated till 1826. This company now derives its water from springs about one mile and a half north of the town, and supplies from 12,000 to 16,000 of the population.

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The largest company is the Trent Water Company, incorporated in the year 1825. This Company obtains its water from a reservoir and other works on the banks of the Trent, three-fourths of a mile south of the town, and supplies upwards of 36,000 of the population of Nottingham and of the adjoining village of Sneinton.

The minor works procure their water from wells sunk in the new red sandstone rock, and supply together probably 5000 inhabitants.

The supply for the extinction of fires is wholly obtained from the works of the Trent Company, and mostly so for the watering of streets.

27. It is not known that any quantitative analyses of the waters supplied to the inhabitants of Nottingham are in existence. I believe all the waters are, in respect of quality, unexceptionable: They are almost invariably pellucid, and contain only usual proportions of sulphate and carbonate of lime, muriate of soda, &c. The water of the sandstone rock contains, in addition, carbonate of magnesia in notable quantity. The qualities of all the waters vary somewhat according to the period of the year and amount of rain, particularly those of the two incorporated companies.

No complaints are made against any of the waters, except such as have their origin in the competition of the companies. These, under whatever form they may be alleged, almost invariably resolve themselves into an application for reduction of rent. No evils are experienced by the public in respect of the supply or quality of the water in Nottingham. The companies are, however, frequently much imposed upon, and are upon the whole very ill-remunerated for the capital invested. The Old Company has received no dividend for near 20 years. The Trent Water Company paid no dividend for five or six years; and although this Company now divides six per cent. on the nominal capital, it does not obtain more than five per cent. on the actual investment. The Northern Water Works Company receives little or no remuneration for its outlay; and the minor works, I am given to understand, scarcely recompense the owners for the trouble and attention bestowed upon them.

28. The modes in use for supplying water to the town of Nottingham are as follow:—

1st. As to the Old Company. This Company possesses a reservoir about one mile and a-half north of the town, into which the water of certain springs flows. The springs are on the margin of the river Leen, and on a fault at the verge of the new red sandstone rock. It is not known how much of this water is produced from the rock, and how much by filtration from the Leen. From this reservoir the water is conveyed by a very circuitous route (through a pipe of about three miles in length, and 10 or 11 inches diameter, with a total fall of 28 feet) to the south-western entrance into the town. Thence the water is pumped by a water-wheel into a reservoir, at an elevation of about 110 feet,

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tenements provide the pipes and apparatus, and discharge the water rent, receiving an allowance of 25 per cent. for risk and trouble.

33. See reply to query No. 27. An impoverished population, such as that of the working classes of Nottingham, will always complain of price, however low it may be.

34. The old Company have no regular scale of charges. The Trent Water Company's scale, established in 1831, and the rates granted by Parliament in 1825, are as under.

Nottingham, Trent Water-Works Company.

Annual Charge or Rent for supply of Water.

House Rent.	Water Rent.	House Rent.	Water Rent.	House Rent.	Water Rent.
£.	s.	£.	s.	£.	s.
5	5	37	29	69	48
6	6	38		70	
7	7	39	30	71	50
8	8	40		72	
9	9	41	31	73	
10	10	42		74	
11	11	43		75	
12	12	44	32	76	52
13		45		77	
14	13	46		78	
15		47	33	79	
16	14	48	34	80	
17	15	49		81	54
18	16	50	35	82	
19	17	51	36	83	
20	18	52		84	
21	19	53	38	85	
22		54		86	56
23	20	55		87	
24		56	40	88	
25	21	57		89	
26		58	41	90	
27	22	59		91	58
28		60	42	92	
29	23	61	43	93	
30	24	62		94	
31	25	63	45	95	
32	26	64		96	60
33	27	65		97	
34		66	47	98	
35	28	67		99	
36		68		100	

	Per Cent.
Allowance to landlords Compounding for tenants, when poor's rates and other parochial charges are paid by them	25
Allowance when rates are not paid by landlords . .	20
Allowance on houses partly used as shops . .	25 to 33

Incidental Annual Charges.	s.	d.
Stable and one horse . . .	4	0
Stable and more than one horse, for each horse . .	2	6
(Stables in inns to be taken at half the number of stalls.)		
Cows, each	1	6
Warehouses	5	0
	and upwards.	
Offices.	5	0
Gardens within the town. .	2	6
Private baths in dwelling-houses	10	0
Slaughter-houses	5	0
Water-closets in private houses	10	0
Water-closets in warehouses, &c.	20	0
Victuallers' brewhouses, two brewings per week . . .	20	0
Ditto, less than two brewings per week	16	0
Pipe for watering street in front of private house . .	7	0
Boilers of high pressure steam-engines, working 10 hours per day, per horse power .	9	0
Lace dressing rooms, per yard in length, single frames .	0	9
Ditto, double frames . . .	1	0
Bakehouses	5s. to 8s.	
Malt-rooms per quarter of malt contained in the steeping cistern	2	6
Water consumed in erection of new buildings, per yard superficial, on plan of each story	0	1
Water consumed in erection of fence-walls, per yard superficial.	0	0½
Mill hands, for drinking and washing only, per indivi-employed	0	3
Workhouses, including baths and washing-rooms, per individual on the average of the whole year.	0	8

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Special Annual Charges.

Supplies by size of Pipe for Dyers, &c.	£. s. d.	Estimate Accounts. Gallons.	£. s. d.	
½-inch	5 0 0	50,000	1 10 0	Including allowances for over-consumption, waste, and contingencies.
⅝-inch	7 10 0	100,000	2 12 9	
¾-inch	10 0 0	200,000	4 12 0	
⅞-inch	15 0 0	300,000	6 10 0	
1-inch	20 0 0	400,000	8 6 0	
1⅛-inch	25 0 0	500,000	10 0 0	
1¼-inch	30 0 0	600,000	11 12 0	
1 and 1 inch . .	35 0 0	700,000	13 2 0	
1⅛ and 1-inch . .	40 0 0	800,000	14 10 0	
1⅛ and 1⅛-inch, or .	45 0 0	900,000	15 16 0	
1¼ and 1-inch . .		1,000,000	17 0 0	
1¼ and 1⅛-inch . .	50 0 0	2,000,000	32 0 0	
1¼ and 1¼-inch . .	55 0 0	3,000,000	45 0 0	

Rates allowed by Act of Parliament.

"Where the rent of such dwelling-house, or part of a dwelling-house, shall not exceed 20*l*. per annum, at a rate per centum per annum not exceeding 7*l*. 10*s*.; and where such rent shall be above 20*l*. and not exceeding 40*l*. per annum, at a rate per centum per annum not exceeding 7*l*.; and where such rent shall be above 40*l*. and not exceeding 60*l*. per annum, at a rate per centum per annum not exceeding 6*l*. 10*s*.; and where such rent shall be above 60*l*. and not exceeding 80*l*. per annum, at a rate per centum per annum not exceeding 6*l*.; and where such rent shall be above 80*l*. and not exceeding 100*l*. per annum, at a rate per centum per annum not exceeding 5*l*. 10*s*.; and where such rent shall be above 100*l*. per annum, at a rate per centum per annum not exceeding 5*l*.; and every rate shall be payable according to the actual amount of rent, where the same can be ascertained, and where the same cannot be ascertained, according to such rent as such inhabitant shall be assessed for the house tax: Provided nevertheless, that the said Company of proprietors shall not be entitled to receive from any such inhabitant more than the sum of 10*l*. in any one year for such supply, nor shall such Company be obliged to furnish such supply to any inhabitant for less than 12*s*. in one year, unless they shall think fit so to do; and in case of schools, manufacturers, dyers, printers, bleachers, brewers, inn-keepers, livery stable-keepers, alehouse-keepers, vintners, or other persons requiring a supply of water for other purposes than those for his or her own family's consumption, or persons requiring a supply of water for baths, ponds, pools, or closets, or for washing carriages, or for cows or horses, or for the purposes of any trade or business whatsoever, such supply shall be furnished by the said Company of proprietors in such cases at such rate as shall be settled by and between the committee of management of the said Company and such persons respectively."

35. It is impossible to state with accuracy the quantity of water consumed by each class of tenants, as all take it *ad libitum*. The quantity delivered by the Trent Water Company is after the average rate of 17 or 18 gallons per individual per diem, or 80 or 90 gallons per house, but this is inclusive of trade consumption, the amount of which cannot be satisfactorily ascertained.

36. The charges for water cannot possibly be enhanced beyond the rates allowed by Act of Parliament, and practically can never attain that limit. But in respect to inferiority of quality or deficiency of quantity, the Acts authorizing the establishment of water companies do not profess to afford any redress. It has indeed been suggested, that perhaps a mandamus from the Court of Queen's Bench might in the latter case issue, to compel a neglectful Company to afford a proper supply; but I have never heard of any application being made to that Court to interpose its authority for this purpose, nor do I think such a course would be complete or effectual: an appeal to Parliament by Bill to establish an additional Company is the unsatisfactory and very expensive mode of procedure usually adopted. As it rarely happens that the defect from which a public inconvenience arises extends to more than a small portion of the works or capabilities of the Company complained against, the remedy applied by Parliament is always of necessity many times more extensive than is actually requisite.

Parliament authorizes the establishment of public Companies, requiring from them the faithful fulfilment of certain purposes in return for conferring the necessary powers, provisions, and limitations which are deemed to be useful and proper for the preservation of the interests both of the proprietors and of the public. But here the concern of Parliament terminates; *no competent authority is appointed to compel the fulfilment of the purposes, or to protect the Companies against the aggressions of the public;* the consequence is, that the Companies and the public are left to adjust their conflicting interests as well as they can. The Companies on the one hand usually seek to obtain all they can from the public, and on the other hand the public generally takes the first opportunity afforded to set up rival establishments to crush what it denominates "an odious monopoly," and to institute an acrimonious rivalry from which its promoters futilely expect to derive a permanent advantage. That "competition must do good," is a maxim of such universal acceptance, that Parliament now without much hesitation concedes the necessary powers to the proposed rival, and again *without imposing supervision.* A second capital therefore becomes invested—a warm contest for public patronage ensues, which usually ends in one, or perhaps both the Companies being reduced to the verge of ruin: at length a coalition takes place—dividends must now be made upon at least a double investment, the expenses of duplicate works and managements must be defrayed, and the final result almost invariably is this—that the public pays more than at first, or at least *equivalently* fails to obtain those reductions which a single Company might, and *under proper supervision* would, have effected. But this is not all; both works are constructed with little regard to future wants; though in duplicate, they are scarcely capable of being extended except at

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great and disproportionate cost, and thus the streets and highways become filled with indifferent and parallel works to the great inconvenience and obstruction of other public accommodations of at least an equal degree of importance. And so great is the uncertainty of capitalists with respect to the security of investments in public undertakings, that it has become needful as an inducement to authorize the shareholders to divide upon the capital employed a much higher rate of interest than would be required if greater security were afforded. Moreover, all these circumstances operate most injuriously in other ways. The value of the shares in the undertaking fluctuates with the hopes and disappointments of the holders, jobbing and gambling result, confidence is weakened or destroyed; when shares are high, the public are vehement in their expressions of dissatisfaction, and active in their endeavours to introduce an opponent; when low, the holders (*amongst whom are very commonly found the widow and the orphan*) are materially injured, and not unfrequently ruined. And it may be further observed, that the apprehension of insecurity is found to operate most powerfully and most injuriously, during periods of commercial depression, when the maintenance of public confidence and private credit is of the last importance to the general welfare.

37. A permanent Board ought, in my judgment, to be established for the purpose of directing and superintending the operations of all public companies and other public bodies, which derive their powers from local Acts and Royal Charters. This Board would not only hear and remedy grievances as they might arise, but would, by the introduction of better construction and more experienced management, provide as far as possible against their origin. The companies themselves would encounter less risk and feel more secure under the protection of a permanent Board than they now feel in the hands of the public. In short, both parties would be much benefited by the operation of a supervising and appellate authority, and particularly so, if the members were selected with the same attention to their competency for the discharge of their duties as is now bestowed in the choice of judges in the superior courts. They ought to be equally independent and to hold their appointments not at will but at the very least "*quamdiu se bene gesserint.*" The cost of the Establishment would be insignificant in comparison with the vast sums now annually wasted in establishing and conducting the operations of public companies, while national benefits would accrue from its operations and under its influence quite independent of and far beyond those which would undoubtedly result from the introduction of increased efficiency of construction and greater economy of management.

38. The water supplied is so pellucid that filters are wholly needless, and accordingly there are very few if any in use.

39. The Trent Water Company maintains the supply by night

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and by day, and has done so ever since its establishment, (12 years ago,) except during a period of one month, when for the purpose of experiment, the water was shut off at 10 in the evening and turned on again at 5 in the morning; it was then ascertained that it would be less expensive to pump water than to maintain an extra establishment of servants and workmen to open, shut, and repair the valves, to draw the fire-plugs for the more frequent cleansing of the pipes, to attend to complaints of deficiency and inconvenience, and to make the inspections necessary to prevent advantage being taken of the absence of the water to attach communication-pipes without the Company's consent or knowledge. The original plan was therefore resumed without loss to the Company, and with very decided convenience and security to the public. Any other Company being possessed of an ample quantity of water at its works, and an adequate reservoir in a sufficiently elevated situation, may adopt this mode of supply *without difficulty or disadvantage;* as I find that one experienced man and a youth of 18 years of age are quite sufficient to manage the distribution of the constant supply to near 8000 tenants, and to perform all the necessary plumbing and repairing required by the branch-pipes and mains. The Old Company has followed the example of the Trent Company, and now maintains a nearly constant supply.

40. There is no system of stand-pipes for cleansing houses and pavements; some few cocks have at different times been put down for private individuals at a charge of 7*s.* per annum. They have been found inconvenient, and have been, in nearly every case, abandoned by the parties who ordered them.

I do not think such a system as that implied by the query would be beneficial in English towns, nor do I think *domestic servants* would manage the force of water with ease or safety. If adapted and used for the contemplated purposes, the apparatus must certainly be placed under the management of competent persons, who should go from door to door at proper hours to apply it; but as many walls are thin, and the bricks of which they are built are absorbent, I cannot recommend an unlimited application of water to the fronts of houses. I believe, however, that a well-arranged system of stand-pipes applicable to the purposes of road watering, street scouring, the extinction of fires, the flushing of sewers, and other similar public uses, would, in the hands of skilled officers, be not only a great present convenience and security to the community, but ultimately prove to be attended with a real pecuniary economy of no inconsiderable amount.

41. The water is always in readiness and at full pressure in the mains of the Trent Water Company, from whose numerous plugs it is instantly obtained in case of fire. Immediately on the drawing of a plug, a stand pipe fitted with cocks, hose-pipes, and nozzles, can be applied, and the water be thence thrown upon any building of the usual height of three stories, if situated on the low

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or medium levels of the town. Those parts of the town placed more nearly on the level of the upper reservoir of course cannot command this advantage. The stand-pipe is always used to fill and enable the fire engines to take up any position that may be found most desirable. Great additional force can be given to the jet from the stand-pipe by closing the communication with the reservoir and pumping directly into the mains with the whole power of the engine, but the injury occasioned to the lead pipes and other weaker works of the Company's tenants by the increased strain would be such, that this course, however in other respects desirable, cannot be prudently resorted to. With the ordinary pressure, and a half-inch adjutage only, water has been thrown from a hose-pipe over a four-story building, the plug being 70 feet below the reservoir, the estimated height of the jet 48 feet, and the discharge 33 hogsheads per hour.

42. From 20 minutes to half an hour will usually elapse from the time of despatching the messenger before the fire-engines arrive and get into effective operation.

43. There are no special arrangements provided by the Company to afford supplies of water for the protection of buildings and other property from damage by fire. Two mills have vertical iron pipes, of three inches diameter, placed in the staircases, with branches to each floor; these pipes communicate with the Trent Water Company's mains, from which, by opening the cocks, the floors may at any time be partially flooded. A few other premises have fire-cocks and hose pipes.

44. Perhaps only four or five fires have happened per annum, nor have these been of much magnitude. The accidental circumstance of the bed-room floors of houses in Nottingham being generally constructed of plaster (burnt gypsum), two inches and a-half in thickness, instead of boards, prevents the origin and spread of fires. In about 9000 houses coarse plaster is the only material used for floors above the ground story, the floor of which is mostly laid of bricks; in half the remaining houses the two-pair floor is of plaster; and in many of the better houses plaster is used instead of lime pugging or sawdust beneath the boarded floors. A "counter-plaster floor," of one inch and a-half thick, placed between the floor and ceiling, and in the roof, is the best preventive to fire and the passage of sound and cold with which I am acquainted.

45. There are no proper party fire-proof walls in Nottingham. Except in the ancient parts of the town, each distinct property usually possesses its own boundary wall. In no cases are the walls of connected buildings carried through and above the roof. In the majority of instances the end or side walls of buildings are only four inches and a-half thick, and almost invariably so in ranges of small houses, whatever may be their extent; even in great numbers of first-class houses the narrowness of the plots has rendered

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the abstraction of a few inches from the thickness of the walls a matter of considerable importance.

46. The police have just begun to act as firemen, but with what efficiency I have fortunately not had the opportunity of remarking. There are four or five very good and tolerably well-appointed engines under the control of the Municipal Watch Committee.

47. The general condition of the town with respect to its health is singularly bad. The annual mortality is 2·84 per cent. The average age at death amongst males is only 20·5 years, and amongst females 23·9 years; and yet the site of the town is decidedly salubrious, and the occupations of the people not necessarily unhealthy.

To arrive at a satisfactory conclusion respecting the actual sanatory state of the town, I have, with great care, analyzed the mortuary registers for the years ending June 1840, 1841, 1842, and 1843, comprehending the two years preceding, and the two years subsequent to, the census of 1841; and from these and other sources have been enabled to ascertain the rate of mortality, the age at death, the degree of density, and other of the more important particulars requisite in an investigation of the causes of human mortality.

The abstracts compiled from these documents, and the calculations based upon them, extending as they do to each of the 65 enumeration districts into which the town was divided by the Census Commissioners, are, I am aware, far too numerous and voluminous to be included within the necessary limits of this report. I have, therefore, condensed the more important facts into the following tables.—See pages 330, 331, and 339.

TABLES showing the different RATES of MORTALITY prevalent in the differently conditioned Districts of the Town of Nottingham.

TABLE No. 1.—The Mortality of Wards.

a. Wards enumerated in the order of their respective Rates of Mortality.	b. Population, excluding Public Institutions.			c. Space for each person in Yards. Sub-districts.		d. Altitude above the Summer level of the River Trent in feet.	e. Number of Deaths in four years, excluding Public Institutions.	f. Proportion of Deaths per Annum to 100 of the Population.	g. Mean age at Death.			h. Range of the Mean age at Death in the Sub-Districts.	k. Years of Life lost by each Person.	l. Approximate Proportion of life lost by each Person.	m. Proportion of Deaths to Births.
	Males.	Females.	Persons.	Min.	Max.				Males.	Females.	Average.				
1. Park . .	2,186	3,047	5,233	24	..	40 to 180	408	1·95 or 1 in 50	29·4	29·3	29·3	18·5 to 39·3	0	0	1 to 1·31
2. Sherwood	2,417	2,813	5,230	18½	..	60 to 200	421	2·01 or 1 in 50	20·0	28·2	24·3	20·2 to 40·0	6½	⅕ +	1 to 1·41
3. Castle .	3,230	3,887	7,117	11½	81	12 to 70	662	2·32 or 1 in 43	19·3	26·5	23·0	24·3 to 33·4	8½	⅓ −	1 to 1·42
4. Exchange	2,725	3,132	5,857	10½	66½	12 to 90	593	2·53 or 1 in 40	20·6	24·1	22·4	17·6 to 27·0	9	3/10	1 to 1·26
5. St. Mary	3,172	3,984	7,156	9½	51	12 to 90	761	2·65 or 1 in 38	18·2	24·0	21·3	18·3 to 33·3	11	⅖ −	1 to 1·5
6. St. Ann .	5,051	5,469	10,520	8½	51½	50 to 150	1175	2·79 or 1 in 36	16·3	21·8	19·2	11·1 to 23·4	13½	½ −	1 to 1·28
7. Byron .	5,117	5,912	11,029	8½	31	30 to 90	1368	3·09 or 1 in 32	17·3	18·7	18·1	14·3 to 27·8	14	½ +	1 to 1·21
The whole Town .	24,537	28,554	53,091	8½	..	12 to 200 Mean ab. 50	6032	2·84 or 1 in 35	20·5	23·9	22·3	11·1 to 40·0	9	3/10	1 to 1·21

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Table No. 2.—Showing the Density of the Population, and the Mean Age at Death in differently conditioned Minor Districts of the Town of Nottingham; and the apparent influence of Density on the Mean Age at Death.

Yards of Surface to each Inhabitant.	No. of Inhabitants per Acre.	Mean Age at Death.	Yards of Surface to each Inhabitant.	No. of Inhabitants per Acre.	Mean Age at Death.
Rural District.		40·0	13	376	21·7
40½	120	39·3	..	..	21·7
..	..	36·7	8½	568	21·3
..	..	36·6	25½	190	20·9
28½	170	33·4	9½	512	20·7
34	143	33·3	38½	127	20·3
48½	100	32·4	10½	460	20·3
30	161	31·8	..	..	20·2
36	135	30·8	11½	426	20·2
38½	126	30·6	17½	277	20·1
31	155	27·8	14½	330	19·7
33	147	27·0	20½	238	19·4
45	108	26·9	23½	206	19·2
31½	151	26·6	16½	292	18·7
38½	126	26·4	24	203	18·5
35½	136	26·3	51½	96	18·4
81	69	26·3	51	97	18·3
28½	170	26·1	27	180	17·8
24	204	25·9	10½	453	17·6
21½	230	25·4	16	307	17·1
22	222	25·2	..	..	17·1
50	97	24·5	13½	365	16·5
12½	389	24·4	16½	295	16·3
30½	158	23·6	..	..	15·5
22½	216	23·6	..	..	15·4
11½	418	23·4	16½	293	14·9
14½	336	23·2	13½	365	14·9
28½	171	23·1	11½	417	14·3
42½	114	22·4	..	..	14·3
66½	73	22·4	15½	313	13·2
18½	259	22·4	18½	265	13·1
20	213	22·2	11	438	11·1
10	492	22·2			

Average of the Mean Densities = 187 Inhabitants per Acre.

Average of the Mean Ages at Death = 26·6 Years.

Average of the Mean Densities = 316 Inhabitants per Acre.

Average of the Mean Ages at Death = 17·8 Years.

The extreme denseness of the population, the high rate of mortality, the low age at death,—both indicative of a short duration of life, and the extraordinary differences in the sanatory conditions of the best and the worst-conditioned districts indicated by these tables, will probably be thought to demand some further explanation. I may, however, pause to remark, that these returns afford important corroborations of the accuracy of the conclusions stated by Mr. Chadwick in the Supplement to the Sanatory Report, page 245:—"That there is no general law yet established that is applicable to all places and all countries, or to all classes or to all times, as commonly assumed; that every place and class and period has rather its own circumstances, and its own law varying with those circumstances;" and that, as a practical consequence, in assuring against the casualties of sickness or mortality, the immediate town, or parish, or district experience should, when attainable, be regarded as preferable to any assumed law deduced from other

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to each inhabitant, affords, upon 97 deaths, a mean age at death of 14·3 years; and another adjacent district, of still more recent erection, affords, upon 63 deaths, a mean age at death of only 14·9 years.*

In Castle Gate, open, elevated, and well drained, the mean age at death is 30·6 years ; while in Mortimer-street, crowded, low, and indifferently drained, the mean age is 17·1 years: the former has 38½ yards of space to one person, the latter only 16 yards.

4. *Exchange Ward.*—This ward is also situated on the south side of the town, and, for the most part, on very low ground, but little above the canal, and almost on the level of the Floods from the Trent. The drainage of the streets is tolerably good, but many of the courts are still in a very foul condition. The highest mortality occurs in the district which includes the cellar dwellings of Sussex-street; these are neither drained nor provided with adequate ventilation; some of them are exceedingly damp, and the whole are uncomfortable and unhealthy.

5. *St. Mary's Ward.*—This division contains many unpaved and undrained streets and houses, erected back to back, with privies adjoining to and under the dwellings. The rate of mortality is high and the mean age at death low in very exact proportion to the defective physical condition of the neighbourhood.

6. In *St. Ann's District*, the dwellings of the working-classes are generally built in small enclosed courts erected back to back, ill ventilated, and, in many cases, very indifferently drained. The rate of mortality and the density of the population are both higher in this ward than in any of the wards previously described.

In one of the sub-districts the infant mortality is so enormous as to reduce the mean age at death to 11·1 years, and is distinctly traceable to the vitiation of the atmosphere occasioned by the overcrowding of families into a single sleeping apartment. In this case the dwellings are erected back to back, with only one bed-room to each.

7. *Byron Ward.*—This ward comprises the densest and the worst-conditioned quarter of the town; it abounds with ranks of back-to-back houses, enclosed courts, privies under dwellings, unpaved and undrained streets, cellar apartments, and barrack lodgings. As an inevitable result the mortality is excessive, and

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* These, and other similar instances, are not included in the Table, in consequence of the locality of many of the deaths which occurred in the neighbourhood being too imperfectly described in the register to admit of being satisfactorily employed in the investigation of the corresponding rate of mortality. There is, however, no reason to presume that the mean derived from the whole of the deaths would materially differ from the mean derived from a large portion of the deaths. Indeed, I have generally found that the mode of comparison afforded by the mean age of death possesses in this and some other respects advantages over that by the rate of mortality or of the proportions of deaths to the population which cannot be deduced unless the precise locality of the entire number of the deaths be accurately defined, and which, as commonly used, undoubtedly creates impressions with respect to the actual duration of life not less erroneous than those produced by returns of the mean age of death alone.

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the depreciation of life extreme, the annual deaths being 3·1 per cent., and the mean age of death only 18·1 years.

8. *The whole Town.*—The deaths of the whole town include 443 deaths in the workhouse, the causes of which it was found impossible to assign to their proper localities in the wards; for this reason the mortality of the wards, great as it is, is nevertheless considerably understated. The general rate of mortality is 2·84; but if 103 deaths be deducted for country patients treated in the General Hospital, and registered in Nottingham, it will become 2·80, which, after this deduction, is still 26 per cent. greater than the mean mortality of England. The mean age at death in Nottingham is 22·3 years, or about seven years lower than the average age at death in England and Wales.

With the desire of attracting attention to the great waste of existence consequent on this low sanatory condition of the town, I have appended to Table No. 1 two columns (*k* and *l*), to exhibit, in a popular way, an approximate view of the loss of life averagely sustained by the inhabitants of the several wards and of the town at large.

The peculiar circumstances of Nottingham, and the present state of the registers,* do not permit the formation of Local Life Tables upon which any reliance can be placed, otherwise it would have been possible to compare Life Tables suitable to each of the wards with the very excellent National Life Table recently published in the Fifth Report of the Registrar-General, and thence to have deduced the actual loss of life on deaths occurring at every age. Nevertheless, in the admitted absence of sufficient data from which to derive the true mean duration of the lives of a town population constantly affected by migrations from within and from without, we may tentatively, yet favourably assume that the ratio of the mean age at death to the mean duration of life is the same in Nottingham as it appears to be on the average of England and Wales, namely, 1 to 1·4 nearly. The loss of life in Nottingham, by the operation of causes principally of a physical and undoubtedly of a removable nature, would therefore, upon this favourable supposition, appear to *average* not less than 9 or 10 years to each individual, while in many of the districts more especially distinguished by the impressive presence of visible causes of disease and mortality, the waste of existence (especially amongst the working-classes) attains an amount which cannot be contemplated without a sensation of pain and an earnest desire for the immediate application of some remedial measure. That the *postponement* of remedial measures, so far from being attended with economy, is an ac-

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* It seems exceedingly desirable that the local registrars should be directed to assign the locus of each death and birth to the Census Enumeration District in which it happened. If this were done, all the facts connected with the sanatory condition of any given district could be satisfactorily investigated, and its state of health be kept constantly under review.

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tual occasion of immense pecuniary loss, in addition to a vast amount of personal affliction, grief, and anxiety, will scarcely be doubted by any one who has carefully studied the valuable expositions of the causes of mortality afforded in Mr. Chadwick's Report on the Sanatory Condition of the Labouring Population of England. As it may, however, be desirable to form some general conception of the amount of loss sustained in particular cases, I shall proceed, with such materials as I have been enabled to collect, to a calculation of the pecuniary losses incurred by the population of Nottingham from the excessive sickness and premature mortality prevalent in that town.

By the introduction of effective sanatory improvements, the duration of life in Nottingham may probably be eventually prolonged to the extent indicated by column (*h*), Table No. 1, and the loss of labour consequent on the existing premature mortality may therefore be to that extent economized; this labour, however devoted, can scarcely be valued at less than 8*s*. per week, or say 20*l*. per year. But the same measures which extend life will also make the existing term of greater value; for the period of sickness will be diminished, and the physical and mental energies of the population will be improved at least in proportion to the extension of life; these advantages cannot be estimated at less than 2*s*. per week for the term of existence now enjoyed beyond the period of full age. Moreover, in the term to which life is capable of extension there will be saved all the existing cases of fatal illness, and all the existing expenses of attendance and funerals. A fatal illness will on the average cost not less than 5*l*., and a common funeral can rarely be performed for so little as 3*l*. Lastly, a great extent of widowhood and orphanage now results from premature deaths, and this is known to entail a very heavy amount of friendly, charitable, and compulsory relief. It is stated that upwards of one-fourth of the premature deaths, whether of male or female, imposes some burthen of this kind either upon relatives or upon some other portion of the community; and it is believed that the average extent of relief afforded (for these are cases of long continuance) is not less than from 30*l*. to 40*l*.

If now we apply these data (hypothetical as to some extent they are admitted to be) to the several wards of Nottingham, we shall obtain the following results:—

Name of Ward.	Pecuniary Loss to the Community by Premature Death.
1. Park	..
2. Sherwood	£584,250
3. Castle	1,628,325
4. Exchange	1,370,510
5. St. Mary's	1,928,740
6. St. Ann's	3,236,300
7. Byron	3,484,590
	£12,232,715

opulations, the Deaths in Byron Ward being assumed=100.†

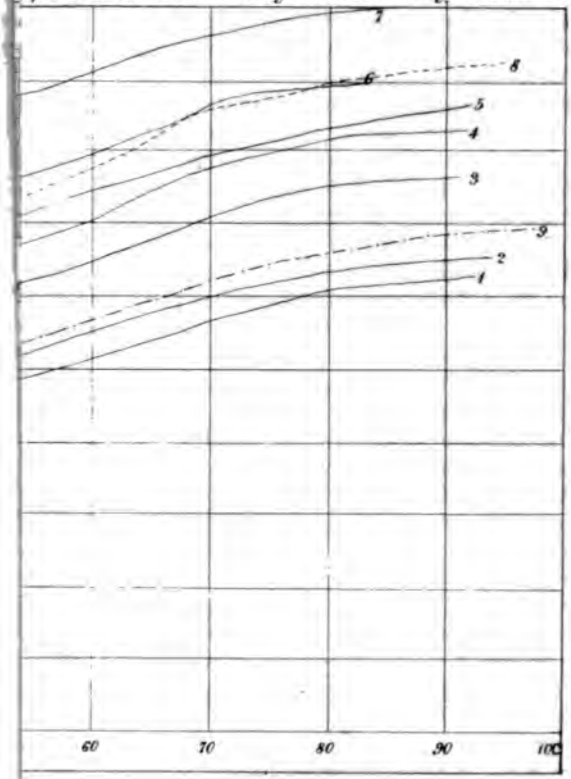

diagram is to be rendered thus _ Up to the age of 40 Byron Ward, will have lost 82 by Death in the same time that Park Ward, (N.º 1 ave lost only 43, each out of the same number of living. Again _ ildren under 5 years of age, S.t Ann's Ward will lose 60 in the time and from amongst the same number of Inhabitants, from which ood Ward will lose only 33.

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by Tho.s Hawksley Esq.re

proportions of deaths in other wards to 100 deaths occurring in Byron Ward: for instance, about 66 deaths of 10 years and under will happen in Byron Ward to 58 in St. Ann's Ward, 42 in Castle Ward, and 30 in Park Ward; 90 deaths will happen at 60 years and under in Byron Ward to 70 in Exchange Ward, and 62 in all England; 64 deaths will occur at 40 years and under in St. Mary's Ward to 47 in Sherwood Ward; 86 deaths will occur in the town of Nottingham, at the age of 70 and under, to 62 in all England and 96 in Byron Ward.

The law of mortality which ought to prevail at the middle and later periods of life is known to be subject to considerable disturbance by the operation of various moral and physical influences, more or less extraneous to, and in great degree independent of, local and removeable agencies; amongst the chief of which may perhaps be mentioned unhealthy business occupations and intemperate habits; it has, also, been long known that, with increase of years, up to that period of life which has been denominated the second childhood, the human constitution becomes gradually more resistful, and, as it were, slowly hardened against the repeated attacks of those more acute disorders incident to an inferior degree of sanatory civilization, by which large portions of an infant population are continually overcome and rapidly swept away. From the operation of these and other more extraneous influences of a disturbing character, an infant population is almost entirely exempted; and on this account, it is considered that an infant population constitutes as it were a delicate barometer, from which we may derive more early and more certain indications of the presence and comparative force of *local* causes of mortality and disease than can be obtained from the more general methods of investigation usually pursued. I am even disposed to believe that there exist comparatively few instances in which causes entirely independent of public control will be found to produce a very appreciable influence on the lives of the infantile portion of the community previous to the termination of the fifth or sixth year; and I would, therefore, propose to measure the sanatory state of any given district by a comparison of the number of deaths of children of stated ages (*not exceeding* five years) which occur from amongst a given number (say 100) of the children who have been born in the period corresponding to such stated ages in preference to the ordinary standards of comparison usually denominated "the rate of mortality" and "the mean age at death."

The following table, constructed on the proposed principle, exhibits, for each of the wards and for the whole town, the number of births which occurred in the five years terminating June 30, 1843, and the number of deaths which happened in the

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quantities but of proportions, the apparent parallelism is, in fact, corroborative of the otherwise well ascertained convergency of the rates of mortality at the latter periods of life.

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same five years amongst the children under one year old, under two years old, under three years old, under four years old, and under five years old respectively.*—See page 28.

The numbers entered in the columns *b*, *d*. *f*, *h*, *l*, of the Table, and the proportions entered in the column *n*, relate to children born subsequent to the 30th June, 1837, and therefore afford strictly accurate indications of the different rates of mortality prevailing amongst children in differently conditioned districts of the town: but, in consequence of the incompleteness of the returns of the births and deaths in England and Wales (the earlier returns not affording the requisite particulars, and the later returns not being as yet published), it has become necessary, for the purpose of comparing the sanatory state of these districts with the sanatory state of the kingdom at large, to include in the numbers entered in the column *p*, and in the proportions entered in the column *r*, the *whole* of the deaths at ages less than 5 years, registered during the given term, without discrimination of the period in which the births of the dying occurred. The accuracy of the results exhibited in the columns *r* and *s* is however very inconsiderably influenced by this unavoidable departure from the more exact method pursued in compiling the antecedent portion of the Table; indeed these results would not have been in any degree affected by the uniform addition of deaths due to births of an earlier date, than that at which the Table was intended to commence, but for the introduction of certain changes in the law of mortality, occasioned by extraordinary depressions in trade, and extraordinary fluctuations in the social condition of the population of Nottingham consequent thereon. It may, however, be well to observe that by the adoption of another method of computation, not rigorously accurate, but of sufficient exactitude to detail any considerable amount of error, I obtain for columns *r* and *s* the following

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[*] The advantages of the proposed test appear to me to be chiefly these—

1st. That an inquiry into the amount of the population may be dispensed with.

2nd. That all investigation respecting the progress of the population becomes unnecessary.

3rd. That troublesome and sometimes uncertain calculations of the rate of mortality, and of the mean age of death, may be avoided.

4th. That ordinary fluctuations by immigration and emigration have comparatively little influence on the accuracy of these results, and are not to be taken into account.

5th. That the consequences of trade and other business occupations do not, at the early ages proposed to be included in the calculations, materially affect the conclusions.

6th. That with very slight alterations in the form of the mortuary and natal registers, and some trifling additional care in making the entries, the proposed measure of the sanatory condition of minor or specially selected districts may at all times be readily, and, as it appears to me, accurately determined.

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TABLE No. 3.—Showing the relative Sanatory Condition of the Wards by means of the Infant Mortality.

DISTRICT.	Total Number of Births Registered in 5 Years ending June 30th, 1843.	Number of Deaths occurring amongst Children in the Five Years ending June 30th, 1843, and the relative Proportion or Per-centage such Deaths bear to 100 Births.										Proportionate Mortality indicative of the relative Sanatory condition of the Districts.					
		Age 0 to 1.		Age 0 to 2.		Age 0 to 3.		Age 0 to 4.		Age 0 to 5.		100 Deaths in Park Ward become in	Excess of Deaths.	Deaths under Five Years.		100 Deaths in England & Wales become in	Excess of Deaths.
		Number.	Per Centage.	Number.	Per Centage.	Number.	Per Centage.	Number.	Per Centage.	Number.	Per Centage.			Total Number.	Per Centage.		
	a.	*b.*	*c.*	*d.*	*e.*	*f.*	*g.*	*h.*	*k.*	*l.*	*m.*	*n.*	*o.*	*p.*	*q.*	*r.*	*s.*
1. Park Ward (exclusive of the General Hospital)	674	118	17·5	153	22·7	161	23·9	163	24·2	164	24·3	100	0	204	30·3	116	16
2. Sherwood Ward . .	743	144	19·5	168	22·6	180	24·2	181	24·4	183	24·6	101	1	227	30·6	117	17
3. Castle Ward . . .	1180	228	19·3	305	25·9	328	27·8	337	28·6	339	28·7	118	18	403	34·1	131	31
4. St. Mary's Ward. .	1432	305	21·3	383	26·7	403	28·1	410	28·6	412	28·8	118	18	493	34·4	131	31
5. Exchange Ward . .	914	214	23·4	271	29·6	298	32·6	305	33·4	305	33·4	137	37	371	40·6	156	56
6. St. Ann's Ward (exclusive of the Union Workhouse) . . .	1926	462	24·0	597	31·0	645	33·5	664	34·5	671	34·8	143	43	806	41·8	160	60
7. Byron Ward . . .	2060	503	24·4	673	32·2	735	35·7	754	36·4	750	36·7	152	52	917	44·5	170	70
The Whole Town . .	9108	2047	22·5	2665	29·3	2892	31·7	2969	32·6	2991	32·8	135	35	3635	39·8	152	52
England and Wales (1841)	512158	..	..	..	..	..	..	..	..	..	..	..	..	133583	26·1	100	0

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numbers, which are on the whole strongly confirmatory of the results afforded by the Table :—

	r.	r.	Difference.
1. Park Ward	112	12	— 4
2. Sherwood Ward	114	14	— 3
3. Castle Ward	132	32	+ 1
4. St. Mary's Ward	132	32	+ 1
5. Exchange Ward	154	54	— 2
6. St. Ann's Ward	161	61	+ 1
7. Byron Ward	171	71	+ 1

It cannot escape observation that this Table, constructed with data totally different from Table No. 1, very completely establishes the general accuracy of that Table, and confers great confidence in the results there exhibited. The only material difference consists in the change of the sequence of Exchange and St. Mary's Wards, and upon this difference I should have been prepared, from a minute and accurate knowledge of the two localities, to pronounce in favour of Table No. 3; the discrepancy is however easily accounted for, as in St. Mary's Ward the annual births amount to no less than 4 per cent. of the population, while in Exchange Ward the births do not exceed 3·1 per cent. of the population. The extraordinary rate of birth in St. Mary's Ward is necessarily attended with a greater absolute amount of infant casualty than occurs (in an equal population) in Exchange Ward; and hence the mean age at death in St. Mary's Ward is reduced considerably lower than it would be if the rate of birth were in that ward the same as the rate which obtains in Exchange Ward.

The general inferences to be drawn from the Table No. 3 are of this important kind,—that the causes of mortality are 52 per cent. more powerful in Byron Ward than in Park Ward, 43 per cent. more powerful in St. Ann's Ward than in Park Ward, and 37 per cent. more powerful in Exchange Ward than in Park Ward; results which are all strikingly confirmatory of previous determinations: that they are, also, 70 per cent. more powerful in Byron Ward than in England and Wales; and that, in the whole town, they exceed the mean force of similar causes in England and Wales by 52 per cent.

That these destructive causes are by no means difficult of detection, will, I imagine, very distinctly appear on reference to the nine accompanying plans of some portions of the town inhabited by the working-classes, and especially on a comparison of these partial plans with the general plan of the Enumeration Districts, annexed to the Table of Vital Statistics.*

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* The neighbourhoods of Meadow-plats, Fyne-street, Millstone-lane, Cartergate, and Narrow-marsh, parts of which were inspected by J. R. Martin, Esq., one of the Sanatory Commissioners, would have furnished numerous examples of a lower character of dwellings than most of those which have been selected for the illustration of this communication.

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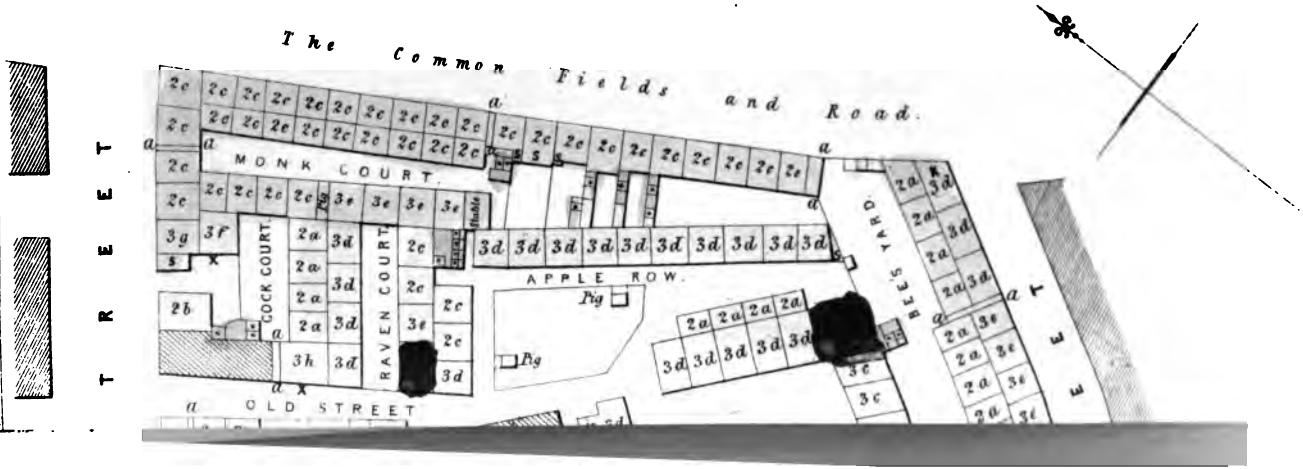
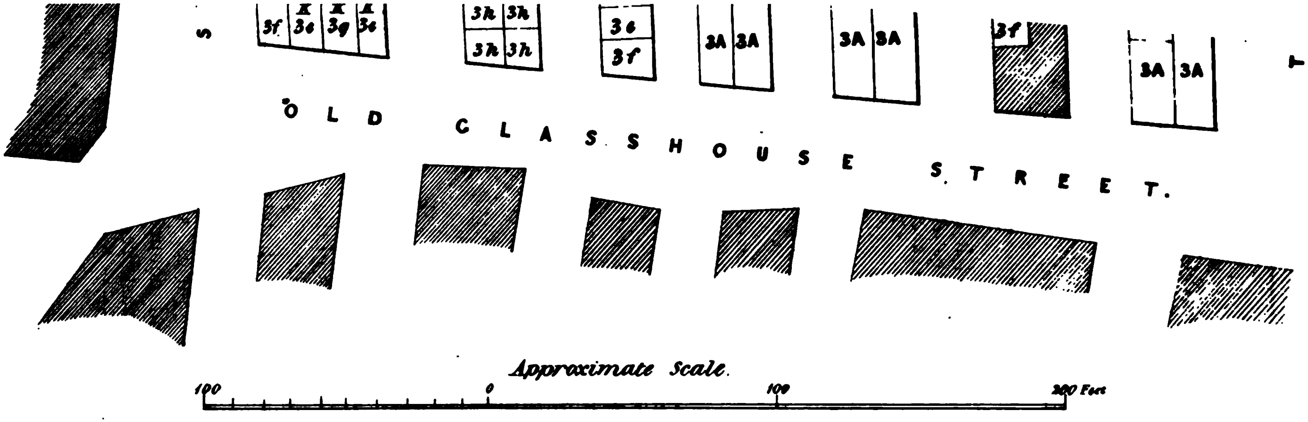
N° 2

SKETCH OF ENUMERATION, DISTRICT, A 9. AND, PORTION OF A 10.

Shewing the arrangement of "Back-to-Back" houses and internal Courts and the consequent deficiency of Ventilation and radiant Light.





Privies under dwellings	■
Privies in Courts	☐
Houses of one room on each floor	☐
Houses of more than one room on each floor	▨
Public Houses	■
Outbuildings	☐

The figures and letters refer to the Table of Classification

The x denotes dwellings known to be let off in rooms.

The Tunnel entrances to the courts are denoted by the letters a a.

Population	1569
Groups of Privies	26
Separate do	74
One Group to 60 Persons	
One Privy to 21 do	
Current Mortality	3·25 per Cent
Mean Age at Death	15 ½ years

Area 17542 Yards

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TABULAR REFERENCE to the Houses shown upon the annexed Plans of Portions of the TOWN of NOTTINGHAM, inhabited by the Working Classes.*

Average Weekly Rents, including Parochial Taxes.	Letter of Reference (see plans).	
		CLASS 1.—HOUSES OF ONE ROOM ON EACH FLOOR.
s. *d.*		SUB-DIVISION 1.—*Houses of two clear stories in height.*
1 9	2 *a*	Living room, and one bed room.
	2 *b*	Ditto ditto, and cellar.
1 11	2 *c*	Ditto ditto, and garret.
2 1	2 *d*	Ditto ditto, cellar and garret.
		SUB-DIVISION 2.—*Houses of three clear stories in height.*
2 2	3 *a*	Living room, one bed room, and workshop.
	3 *b*	Ditto ditto ditto, and cellar.
2 6	3 *c*	Ditto ditto ditto, and garret.
2 9	3 *d*	Ditto ditto ditto, cellar and garret.
2 6	3 *e*	Ditto, and two bed rooms.
2 7	3 *f*	Ditto ditto, and cellar.
	3 *g*	Ditto ditto, and garret.
2 11	3 *h*	Ditto ditto, cellar and garret.
		SUB-DIVISION 3.—*Houses of four clear stories in height.*
	a 4	Living room, two bed rooms, and workshop.
	4 *b*	Ditto ditto ditto, and cellar.
	4 *c*	Ditto ditto ditto, and garret.
	4 *d*	Ditto ditto ditto, cellar and garret.
	4 *e*	Ditto, and three bed rooms.
	4 *f*	Ditto ditto, and cellar.
	4 *g*	Ditto ditto, and garret.
	4 *h*	Ditto ditto, cellar and garret.
		Any of the above houses which possess a lean-to scullery or kitchen, are distinguished by the additional letters S or K.
		CLASS 2.—HOUSES OF MORE THAN ONE ROOM ON EACH FLOOR.
	2 A	2 stories high, with or without garrets or cellars.
	3 A	3 stories high, with or without garrets or cellars.
	4 A	4 ditto
	5 A	5 ditto
		These houses are not made the subject of minute inquiry.

The portion of the plan included within the limits of the enumeration district A 9 comprises an area of only 8280 yards, nd yet contains not fewer than 195 houses and 787 inhabitants; hus affording a proportion of 460 persons to an acre (being more han double the proportion of the densest ward in Leeds), and of nly 10½ square yards to each individual. Piggeries, stables, rivies, and dwelling-houses are congregated and connected in rowded and unventilated courts without the least regard to natory principles; every endeavour, indeed, seems to have been ade to encourage the approach of disease and to retard its

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* The Commissioners have selected three of the plans for publication.

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departure. Some of the courts are below the level of the adjacent streets, and as these are of course more damp and much more insalubrious than others of the same neighbourhood, it is to be regretted that the forms of the mortuary register are not sufficiently exact to enable the deaths which occur in these places to be made the subject of special investigation. It is worthy of remark, that notwithstanding this district is situated immediately adjacent to the commonable lands, and occupies a site on the sandstone rock at an elevation of about 60 feet above the river Trent, the counteracting influence of the local causes of mortality is sufficiently powerful to reduce the age at death to an average of little more than 13 years.

The plan of the enumeration districts B 9 and B 10, which adjoin each other, affords examples of houses erected back to back, and arranged in *parallel ranks*, with openings at each end of the streets. The privies, which are too frequently disgustingly filthy, are in general placed in clusters beneath inhabited dwellings, and constantly send forth most noisome exhalations, which, together with deficiency of drainage, and an imperfect *landlord's* supply of water, contributes to the production of excessive sickness and extreme mortality. B 10, the denser of the two districts, contains very nearly 500 inhabitants per acre, and affords only 9½ yards of surface to each individual. These districts are of *modern* origin, having been erected subsequent to 1820. They were originally ill built, and already exhibit very manifest symptoms of dilapidation and decay.

The plan containing the section of houses is submitted in explanation of the internal structure and arrangement of the dwelling of the working classes. The whole is drawn to scale, and presents a rather favourable specimen of the accommodation afforded by houses of this class. The situation of the staircase, under which are the pantry and coal-place, the height and area of the rooms, the back-to-back arrangement, the tunnel passage, and the exposed privies, are all correctly shown; the width of the court and th regularity of the adjacent streets very considerably exceed th general average of the courts in other parts of the town.

The excessively crowded state of these districts, and indeed o the town generally, is very plainly attributable to the injurio operation of the right of common, which, by imposing a narro limit to the quantity of land available for building purposes, h afforded a direct inducement for the detention of such land fro the market till it should become an article of absolute necessit and as such attain a *necessity value*. Land in Nottingham h therefore, always hitherto been reluctantly and cautiously dol out by the very few proprietors by whom it was held (and by no more cautiously than by the municipal corporation) in *diminuti* lots, at exorbitant prices, and with total inattention to those stru tural arrangements most essential to the moral and social improv

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ment and welfare of the community at large. But it is so very obvious that this monstrous evil might have been averted by the timely enclosure of the commonable lands which not only surround but abut upon and indent themselves into the town, that it becomes needful to explain by the operation of what causes this desirable event has been, and still is, indefinitely postponed.

The freemen, a numerous body of parliamentary *voters,* are in possession of the right of common on the Lammas lands, and, as is too usual with commoners of all descriptions, entertain strong prejudices against the progress of improvement by means of enclosure. Now the corporation being, unhappily for the prosperity and the morality of the town, essentially a political body, cannot dispense with the political services of the small majority of the freemen, by whom the balance of political power is confessedly held. To oblige, and at the same time to retain an influence over this portion of the freemen, the corporation always opposes the land-owners in any attempt to enclose and improve their property by discharging it of an injurious and almost worthless right of common, although it is manifestly for the interest of the town at large that this should be effected, whatever may be the terms proposed, *even to the giving to the freemen, in fee simple, a greater proportion of the improved land than they now possess of the herbage growing on the unimproved land.* Moreover the corporation possesses two considerable estates, numerous small portions of which lie dispersed in the common fields amongst the possessions of other proprietors.* One of these estates, called the Chamber Estate, is held absolutely for the use and benefit of the town at large; the other, called the Bridge Estate, was granted by King Edward VI., and is held in trust "for the sustentation of the Trent Bridge." But instead of appropriating the proceeds of these estates in furtherance of the original purposes, the corporation has from time to time more or less diverted them from those purposes, and applied them to the special advantage of the freemen. Strips of these public estates are now, therefore, from time to time allotted to elderly freemen and their widows, by whom they are held, and enjoyed *during the pleasure of the corporation,* in consideration of the payment of a merely nominal annual rent. In addition, the corporation, which as lord of the manor, claims to have vested in it, on behalf of the town, the soil of the Forest and Mapperley Plain, both commonable at all periods of the year, by at least all the rated inhabitants of the borough, permits many of the freemen, who of course have as such no title whatever to the common right of these lands, to establish themselves in the possession of the property by making forcible entries; cutting down trees, gates, and fences; despoiling gardens; breaking open and destroying buildings; driving, impounding, and damaging the cattle of the lawful commoners, and by exercising other acts of resistless violence,

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* See plan of the commonable lands.

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upon which the corporation, who might and ought at all times to interpose its authority to protect the rights and interests of the public, looks with at least an apparent indifference.

By these concessions, and by these appropriations of valuable public property to and amongst the freemen, the corporation acquires with that body a very considerable amount of party influence, and is therefore, as a political body, naturally indisposed to concur in a measure of enclosure by which it would very probably become deprived of a certain portion of the political power it now possesses.

Other feelings of a more private nature may have also operated with the corporation, as it is known that several influential members of the town council are extensive owners of the small houses inhabited by the working classes in the worst conditioned districts, and have repeatedly avowed their hostility to the principle of enclosure, under what I believe to be the very erroneous impression that this description of property would sustain permanent injury by the erection of better, more healthy, and more comfortable dwellings on the enclosed lands.

The Commissioners appointed to inquire into the State of the Municipal Corporations in England and Wales, after pointing out in their Report the disadvantages resulting from the continuance of the right, and after remarking, "it seems impossible to doubt that an extension of the limits of the town would be highly beneficial to its trade and prosperity," conclude by observing, "it seems that a plan which should proceed upon the principle of converting the limited right of the burgesses [freemen] over the whole, into one extending over a part, but throughout the whole year, preserving at the same time a sufficient space for the recreation of the inhabitants, and leaving the remainder free for the purpose of building, and enlarging the town, *would be eminently beneficial, and ought to be satisfactory to all parties.*

Subsequent, however, to the inquiry upon which the Commissioners' Report was founded, a Bill was introduced into Parliament containing provisions consistent with the foregoing opinion, yet this Bill the corporation, employing the public money for the purpose, strenuously and successfully opposed.

Believing myself in the imperative and increasing necessity for an enclosure of the commonable lands of Nottingham, and of other similarly situated borough towns, I have thought it needful to solicit the attention of the Commissioners to the subject, and to submit that no sanatory measure can be deemed complete or effectual which does not include amongst its provisions the appointment of an *independent* Board or Commission, with full power and authority to effect the enclosure of Lammas and other commonable lands in the immediate vicinity of large towns and populous districts for the general advantage of the public, and on equitable terms to all the parties lawfully interested therein.

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48. The sanatory state of the worst parts of the town cannot as yet be given with any degree of certainty. A defect in the system of registration to which I have already alluded (see note to the seventh query) precludes the immediate possibility of determining the mortality of particular districts; neither would the best kept register disclose the *whole* of the facts; for it would be impossible to determine the effect of the worst districts unless we were able to compel the inhabitants to spend their entire lives in those neighbourhoods; many persons it is true do sicken and die on the spot directly chargeable with the causes of mortality, but others remove from place to place, and at length expire in districts to which such causes are not fairly attributable.

49. The average duration of illness I cannot obtain in a satisfactory manner; it is stated to amount to about 18 days per annum.

50. The general structure of the houses in Nottingham occupied by the poorer classes is unusually defective. The houses are, as already mentioned, chiefly erected *side to side and back to back;* one apartment on plan, and three in elevation; staircases narrow, dark, and unventilated, having pantries and coal places (frequently in one) beneath the timbers of the stairs. The area of the living room is generally about 120 feet, and its height about eight feet; the cubic contents, after deduction of space occupied by the chimney-breast, is therefore about 900 feet. In this apartment five persons on an average take their meals, and, during the time they may be at home together, dwell, thus affording only 180 cubic feet of space to each individual. The area of the next higher apartment, when the building admits of the staircase being constructed without any " return," is of course about the same, but the cubic contents are somewhat less in consequence of the apartment being of inferior height. The difference of height is about six inches. Very commonly the staircase cannot be made to reach the upper story in one " flight," a passage has therefore to be taken off the one pair story, by which one of its dimensions is reduced by a space equal in width to the staircase and the separating partition. This reduction usually amounts to about one-fourth of the whole area and cubic contents of the apartment commonly occupied as the bed-room of the heads of the family, and of at least a portion of their children.

The upper apartment is somewhat differently constructed, according as it is intended to be applied for the purposes of a workshop or of a sleeping-room. When the building is erected with a view to its occupation as a dwelling-house only, this apartment will be generally found to have the greatest area of any in the house, inasmuch as the partition of the " stair-head " does not always occupy the *whole* of one end or side; this room is, however, still lower than the last described, frequently ceiled part way up the " spars " of the roof, often without a fire-place, and sometimes

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separated from the staircase only by an open railing. Great numbers of houses have no sub-story; the living-room floor is nearly invariably made of bricks of an exceedingly absorbent nature, which are laid on earth raised only a very few inches above the level of the adjacent street or court; the upper rooms have floors of about two inches in thickness cast of a mixture of coarse plaster of Paris and ashes, on a stratum of reeds laid on the floor joists. These floors are exceeding absorbent of moisture, very cold to the feet, and, if much used or badly executed, are very apt to degrade on the surface into an exceedingly fine and dusty powder, leaving unsightly cavities and considerable irregularities.

The front wall of the houses, in which wall the windows are placed, is nine inches thick (in some few cases of two-storied houses it is only four inches and a half thick), and all the other walls are four inches and a half thick, except the division wall of the pantry, which is either of lath and plaster, or of studs filled in with brick on edge. No measures are resorted to for the purpose of preventing the effects of absorption and capillary attraction, consequently many of the dwellings of the poorer classes are some distance from the floor, and, particularly in the front walls, damp and uncleanly. Hence, as a consequence of the usual accommodation of feelings and habits to external circumstances, result a carelessness or neglect of domestic cleanliness and comfort, and a strong tendency to a lower position in the scale of civilization, which all the good influences within the reach of the occupants can scarcely successfully combat.

Slates and pantiles are extensively used as coverings for the roofs; plain tiles, formerly employed to a great extent, are now entirely dispensed with, principally on account of the stronger timbers and higher pitch which this covering necessitates. The Welsh slates are now had so cheap and light that they are gradually superseding the use of tiles of every description. Nevertheless the roofs formed of these slates are rarely well constructed, and hence, after a few years, the weather in many places penetrates the building, and the upper rooms become damp, disagreeable, and cold.

With respect to windows, a decided improvement has for some time past taken place; in houses fronting the *streets*, "vertical sliding sashes" are now usually employed, and in courts "Yorkshire sashes" have entirely superseded the use of the ancient "lead-light."

The houses are weakly founded, and very slightly timbered; mostly built without bond-timber, or even trimmer arches to the fire-places. Very frequently a batten ($6\frac{1}{2} \times 2\frac{1}{2}$) or a half deal ($5\frac{1}{2} \times 3$) is laid across the middles of the rooms as a beam, and upon this joists $3\frac{1}{2} \times 2\frac{1}{2}$, and even less, are laid at distances apart, varying from 18 to 20, or 22 inches. The plaster floors supported

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upon these timbers therefore frequently break, leaving large chasms, and become additionally unsightly and inconvenient.

The roofs are, as might be expected, very slight, the spars being frequently as small as "five out of deal," laid upon a "batten" purlin of about 11 feet bearing, for a roof of 12 to 15 feet semi-span, forming the covering of two back-to-back houses. The laths used for supporting the slates are about one inch wide by five-eighths of an inch thick, and the slates have the smallest "lap" consistent with the present attainment of the builder's object.

A considerable number of houses exist of four stories in height; in these the upper room is almost invariably constructed for and used as a workshop in which lace or stockings are manufactured. In this case the workpeople employed, mostly consisting in part of adult males not belonging to the family, pass and repass on the common stair by which the bed-rooms of the family are approached, and upon which their doors open.

Some houses are only two stories in height, and some of the two, three, and four-story houses have garrets in the roof, occasionally used to receive the lumber of the workshops, and not unfrequently occupied as bed-rooms; they are of a very miserable character, and are generally attained by a ladder placed in the next lower apartment. Other houses have brick cellars, and these are, in some instances, provided with fire-places, to enable them to be used as washing-rooms or as low kitchens. In some cases, the "under-ground" apartment is let off as a separate cellar-dwelling, the usual approach to which is by an alley of a few feet in width, forming a sort of narrow area, extending along the front of the houses under which these dwellings are situated.

Of private yards, private privies, and under-ground drains, matters unquestionably of the last importance to the health and comfort of all classes of the community, and of the not less needful provision for the decent separation of the sexes, these dwellings are, with few exceptions, entirely destitute; and it may be added that those streets and courts which, from the peculiarities of their arrangement and the habits of the occupants, require the greatest care and regard in respect of public drainage and cleansing, really receive from the existing public authorities the smallest amount of sanatory attention. Any consideration of the condition of the courts and alleys is, indeed, almost precluded by the present defective state of the general law, and the absence of any local Act to supply its deficiencies; but with respect to the very numerous streets arranged in parallel ranks, each in general the property of several freeholders, and all duly assessed to the repair of the highways, the case is extremely different, though the fact of neglect remains substantially unaltered since such streets continue to be deemed by the Board of Highways unfit for acceptance as public property, on the insufficient ground that the proprietors of

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the houses therein have not at their own expense already executed the primary forming, paving, and sewage; and this omission (in face of the obvious, the appalling, and the *costly* frequency with which the names of such streets appear on the records of the Union, the hospitals, the dispensary, and the mortuary registers) is deemed of sufficient weight to warrant a refusal of acceptance, notwithstanding the inhabitants of the majority of such streets have been rated to, and have actually paid, assessments for the repair of the highways (during periods of 30, 40, and even 50 years) to an amount probably exceeding the sum requisite to place and maintain them in the condition best adapted to secure the health of the residents and the convenience of the public. For this hardship and its serious consequences a legislative remedy seems to be imperatively necessary.

51. It is impossible to afford a satisfactory average of the number of families inhabiting a house, and of persons living in one room. In many houses, even of small size, two or three families dwell, and of late it is certain this unhealthy and demoralizing practice has been and still is carried to a great extent. In June, 1841, when the census was taken, 678 houses were found to be uninhabited; but in August last an official return to the Board of Guardians shows that at that time 1359 houses were untenanted. As there is no ground for assuming that the population is reduced, it is reasonable to infer that 600 or 700 families must have been recently added to the previous number of lodgers with others. Rooms of 11 feet square often contain families of four, five, or six individuals, consisting not unfrequently of *nearly related adults of different sexes who live and sleep promiscuously.*

52. In some instances, especially when in the vicinity of or over privies, the air of the habitations is excessively foul; in many cases it is unpleasant from a disregard of internal cleanliness, and is perhaps still more frequently so from the crowded state of the courts, and the impossibility of obtaining an adequate amount of ventilation therein.

No arrangements are introduced specially for the ventilation of apartments.

53. Many of the habitations are certainly not comfortably warmed. Fuel is cheap, but the means of purchasing it in *adequate* quantities are not at the command of more than two-thirds of the working population. The fire-places are usually fitted up with an iron range, an oven, and a boiler, or at least a range and an oven. Coal of the adjacent field is always used for fuel; and the variety denominated *hard* coal is generally preferred by the working-classes on account of its greater durability.

54. Gas-light is invariably used in shops (except of the smallest description), but is as yet little employed in dwelling-houses. An escape for the foul air produced by combustion is very rarely provided.

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55. Some of the lodging-houses are in a very filthy and neglected state. There are not, to my knowledge, any public regulations of special application to places of this character, although such regulations are undoubtedly requisite.

56. This question cannot be satisfactorily answered. It is manifest from the brevity of life in Nottingham, and the great number of cases treated at the public charities, that the loss must necessarily be very considerable.

57. The data for the reply to this query cannot be obtained. The extent of relief may be stated in general terms to be exceedingly great. I have ascertained that the names of certain streets *known to produce great sickness and mortality*, appear in the relief books with remarkable frequency.

58. Very nearly the whole of the medical and surgical advice required by the poorer classes is given gratuitously. The Union surgeons treat upwards of 6000 cases per annum (including hospital cases). The Dispensary treats about 3200 cases per annum, and the General Hospital about 2600, of which it is supposed 1000, at least, are cases from the town. The total number of cases, therefore, exceeds 10,000 per annum.

The expense may be estimated thus—

	£.
6000 Union cases, at about 1*s.* 8*d.*	500
3202 Dispensary cases (Report 1843)	642
367 In-patients at General Hospital, at 2*l.* 18*s.* 7¾*d.*	1076
700 Out-patients at General Hospital, at 2*s.* 4¾*d.*	84
	£2302

But as this amount does not include the expenses of the Union Hospital and of various minor charities, it may be inferred that the annual cost of gratuitous medical and surgical aid is not less than 2500*l.*

59. See last reply. Copies of the rules and regulations for the government of the General Hospital and Dispensary I have the honour to transmit herewith.

60. None of the public buildings within the town are ventilated in an efficient manner. The foul air is allowed to remain, or find its way through windows, or at best, apertures in the ceiling, as it may. The plan of establishing a powerful ventilation during the summer months, in the manner practised by Dr. Reid, has not yet been introduced.

61. There is a great extent of commonable lands so disposed as to abut upon and hem in the town on three-fourths of its circumference.* These lands comprehend in the whole 1070 acres, and comprise—

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* The remaining one-fourth is bounded by the estates of the Duke of Newcastle and Earl Manvers: the former is appropriated, as respects buildings, solely to the residences of gentlemen, professional men, and manufacturers, to whom it is let out upon lease, subject to annual ground-rents of 6*d.* and 1*s.* per square yard, according to circumstances; and the latter, of which only three or four acres are

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North of the Town.

	A.	R.	P.
1st. "The Sand Field,"* commonable from the 12th day of August (Old Lammas), to the 12th day of November (Old Martinmas)	191	0	19
2nd. "The Clay Field,"† also commonable from the 12th day of August to the 12th day of November	408	0	30

South of the Town.

	A.	R.	P.
3rd. "The Meadows," commonable from the 6th day of July (Old Midsummer), to the 12th day of August (Old Lammas), and from the 3rd day of October (second fair day), to the 14th day of February (Old Candlemas)	241	3	32
4th. "The East Croft," commonable from the 19th day of September to the 22nd day of November, on payment of a small agistment	47	2	7
	888	3	8

These 888 acres, in the midst of which the town is, as it were, encaged, are *private* property. The commoners have no right whatever over them, except during the limited intervals above mentioned. The commoners of the Sand and Clay Field are at the present time the freemen, and owners of ancient toftsteads; though there is no doubt that at an early, and indeed till a comparatively recent period, the right was enjoyed by all the inhabitant householders paying scot and bearing lot. The commoners of the Meadows and East Croft are exclusively freemen.

Also North of the Town.

	A.	R.	P.
5th. The Nottingham Forest	124	0	26
6th. The Mapperly Common	57	2	22
	181	3	8

These portions are ancient forest lands, the soil whereof vests in the Municipal Corporation as lord of the manor. They are commonable during the entire year by, at least, all such inhabitant householders as contribute to the burdens of the town.

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now in the market, is on absolute sale, subject only to certain restrictions and conditions, having for their object chiefly the external street-appearance of the buildings (see conditions of sale appended); for some of this land adjoining the canal 20*s*. per yard has been paid, and for other portions in a back situation 12*s*. per yard has been demanded. The Duke of Newcastle's estate, situated on the west of the town, is beyond the limits of the borough, and constitutes the magnificent extra-parochial park within the ancient liberties of the castle called "Nottingham Park." Earl Manvers' estate is situated on the east of the town, also beyond the limits of the borough, and lies within the parish of Sneinton. The houses upon the Duke of Newcastle's property are respectable, good, and healthy. The houses on the sold portions of the estate of Earl Manvers are in nearly every respect as bad as the houses of the working classes in Nottingham, to which they immediately adjoin, and which the builders, influenced by a natural desire to obtain the greatest amount of income in return for the very considerable investment of capital (in even a small plot of ground), have adopted for the model of their structures.

* So called from the new red sandstone rock appearing immediately under the surface.

† So denominated from a thin superficial stratum of sandy brick earth, immediately overlying the sandstone.

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